EVALUATION OF THE ALASKA NATIVE HEALTH BOARD'S SANITATION FACILITY OPERATION AND MAINTENANCE PROGRAM

FINAL REPORT ON PHASE II PROJECTS
VOLUME I. SUMMARY AND ANALYSIS

PREPARED BY
INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH

PREPARED FOR
ALASKA NATIVE HEALTH BOARD AND
U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF WASTEWATER MANAGEMENT
UNDER EPA ASSISTANCE AGREEMENT # 990548-01-5

FEBRUARY 15, 2000

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ACKNOWLEDGMENTS

The authors of this report are Sharman Haley, Rosyland Frazier, and Patricia DeRoche at the Institute of Social and Economic Research and William Ashton at EcoSynergy. Nina Miller, project manager at the Alaska Native Health Board, and Joe Sarcone, rural sanitation coordinator at EPA's Alaska Regional Office, were also invaluable members of the team, providing all the field notes, project documents and implementation information for this report. We gratefully acknowledge the cooperation of personnel in the demonstration communities, as well as review and consultation by members of the project Coordinating Committee.

[photo page, same as Phase I report]

One thing I have always maintained is that a good water and sewer system improves the whole lifestyle of the village—starting with health. I was born and raised in Unalakleet and I remember the days when we had to haul our own water and sewer, and the amount of time that it took. Having a good water and sewer system for thirty years now has helped us greatly improve the quality of life by freeing up people to pursue other things . . . . All of this ties in with our past leadership, their vision and their own desire to develop an economic base for Unalakleet. By planning a system that eliminates the time involved for individuals to care for our own water and sewer needs, it freed up the time and manpower to plan instead for other development . . . . I think having water and sewer years ago and planning for all the other services early has everything to do with where we are today as a community, thanks to our past leadership.

Tim Towarak
City Manager
Unalakleet, Alaska
July 15, 1999

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Glossary

ANHB – Alaska Native Health Board

ANTHC – Alaska Native Tribal Health Consortium

AVCP – Association of Village Council Presidents

Billing & Collections – A category of project activity that includes the processes used to enter customer names, send notices or bills, record and track utility customer payments, and communicate and enforce customer obligations to pay.

Boards or Committees – A category of project activity that includes establishing a utility board or committee made up of community members, to set policy and provide management oversight for the water and sanitation utility, or provide advice and policy recommendations to the city or tribal council.

City-Tribe Cooperation – A category of project activity that includes new forms of collaboration between the city and tribal governments to provide water and sanitation services and the operation and maintenance of the facilities. These activities may take the form of transfer of authority, joint operating agreements, or jointly establishing an independent utility.

Collections – An outcome indicator monitoring the amount of revenue collected from water, sewer, flush haul, honey bucket haul and washeteria fees.

Community Involvement – An outcome indicator monitoring the participation of community members in discussion or action related to the water or sewer system in the village either individually; through surveys, meetings, or councils; through active community support in the form of positive comments; or through increased customer responsibility for fees or O&M.

Condition of the Facilities – An outcome indicator monitoring the physical condition of the water or sanitation facilities. Improvements may include routine plant maintenance, major maintenance projects such as boiler replacement, or system upgrades such as installation of shutoff valves, adding flush tank haul units to homes or completing a new sewage lagoon. In villages with honey bucket haul or flush haul systems this includes the purchase of haul vehicles.

Cost Efficiency – An outcome indicator monitoring the operational cost per unit output. Improvements may include: a decrease in water consumption through customer education or water line repair; improved level of service by improved maintenance; decreased demand for repairs due to improved O&M by users; or decreased labor time to conduct monthly billing due to software or training improvements.

EPA – U.S. Environmental Protection Agency

Facility Condition – See Condition of the Facilities.

Financial Management – An outcome indicator monitoring the financial management practices for a utility, including, billing, collections, purchasing, record keeping, payroll taxes, accounting, debt management, budgeting, fiscal control, or financial reporting. Improvements may include upgrading computer software, improving bookkeeping through staff hiring or training, or improving fiscal reporting to the council.

Financial Planning & Management – A category of project activities that relate to the financial planning and management of a water or sanitation system, including, billing, collections, purchasing, record keeping, payroll taxes, accounting, debt management, budgeting, fiscal control, financial reporting, rate studies, and revenue enhancement. (See also Billing and Collections)

IRA Council – Tribal government organized under the Indian Reorganization Act of 1934.

ISER – Institute of Social and Economic Research

LGS – Local Government Specialist (Department of Community and Economic Development)

Maintenance and Facility Improvements – A category of project activity that includes identified maintenance tasks on water and sanitation facilities, especially large irregular or deferred maintenance projects, and identified tasks to upgrade water and sanitation facilities. Examples include routine plant maintenance, major maintenance projects such as boiler replacement, or system upgrades such as installation of shutoff valves, adding flush tank haul units to homes or completing a new sewage lagoon. In villages with honey bucket haul or flush haul systems this includes purchasing haul vehicles. The activity may include expenditure of grant funds on extra hours for the operator, wages for assistants, contract engineers or consultants, as well as equipment or parts.

Office Equipment – A category of project activity that includes purchasing computers and software.

OIT – Operator in Training

O&M – Operations and maintenance

O&M Policies, Procedures or Plans – An outcome indicator monitoring the status of policies, procedures and plans governing the operation and maintenance of a village water or sanitation system; can include an O&M plan, a maintenance schedule, a system of record keeping or reporting, a system for inventory and record keeping for parts, or a system for identifying and ordering parts.

O&M Planning & Record Keeping – A category of project activity that includes development, revision, or adoption of policies, procedures or plans related to the operation or maintenance of a village water or sanitation system; can include development of an O&M plan, a maintenance schedule, a system of record keeping or reporting, a system for inventory and record keeping for parts, a system for identifying and ordering parts, or an O&M assessment.

Operator Hours – An outcome indicator monitoring the hours per week the water and sanitation system operators report to work.

Operator Skills – An outcome indicator monitoring the capability and experience of the operators to operate and maintain a village water or sewer system, as indicated by certification status, training, and experience.

Operator Support – A category of project activity that includes paying water or sanitation operator wages from project funds.

Operator Training – A category of project activity that includes attending training workshops or over-the-shoulder training to upgrade the knowledge, skills or certification status of water or sanitation operators.

Ordinances – A category of project activity that includes developing and adopting an institutional framework of utility ordinances covering topics such as management structure and authority; utility responsibilities; customer responsibilities; rates; and collections and enforcement procedures.

Partnership Team – A category of project activity that includes the commitment to communicate and collaborate on project activities with various community and agency personnel; identified team members often include the operator, utility clerk or manager, city or tribal administrator, RWM, RUBA or LGS, VSW or ANTHC engineer, regional health corporation staff, and consultants or company reps.

Parts & Supplies – (1) A category of project activity that includes inventorying and purchasing critical spare parts and supplies used in the operation and maintenance of a village water or sewer system. (2) An outcome indicator monitoring the available stock of tools, parts or supplies.

PHS – U.S. Public Health Service (IHS - Indian Health Service) formerly provided facility construction and other assistance to villages for water and sanitation. These functions have largely been assumed by the Alaska Native Tribal Health Consortium (ANTHC).

Planning, Ordinances and Procedures – A category of project activity that includes the development, revision, or council adoption of policies, procedures or planning related to the utility management of a village water or sewer system, including ordinances, user agreements, customer surveys, and facility or service planning.

Policies & Planning – See Utility Policies, Procedures or Planning.

Rate Study – A category of project activity that includes data collection and analysis to analyze utility costs, patterns of service, or consumer ability to pay, for purposes of establishing or revising a fee schedule for water and sanitation services.

Revenue Enhancement – A category of project activity that includes strategies other than fee collection to augment utility revenues. This may include fundraising events, budgeting a portion of gaming or other local government revenues, or grant writing.

RMW – Remote Maintenance Worker; RMWs are circuit-riding employees of the regional health corporations who provide technical assistance and training to water and sanitation operators in their region; the RMW program is coordinated statewide through the Alaska Department of Environmental Conservation.

RUBA – Rural Utility Business Advisors (Alaska Department of Community and Economic Development) provide administrative training and assistance to clerks, managers, and boards or councils responsible for water and sanitation utility management.

Scheduled Maintenance – An outcome indicator monitoring the performance of routine maintenance activities as prescribed in a preventive maintenance plan for water and sanitation facilities.

Utility Management – An outcome indicator monitoring the structures and resources for governance or organizational management of the water or sewer facility system, including policy making and oversight by a board or council, executive leadership, oversight and planning by a manager or administrator, and clerical and administrative support by a manager or clerk.

Utility Management Training – A category of project activity that includes attending a Department of Community and Economic Development training workshop on utility management, or over the shoulder training by a RUBA or consultant focusing broadly on utility management issues (not primarily financial management—see Financial Management above).

Utility Manager or Clerk – A category of project activity that includes creating and filling a utility manager or clerk position to provide focus and expertise in utility administration, and increase the time and planning devoted to it.

Utility Policies, Procedures or Planning – An outcome indicator monitoring the status of policies, procedures or planning related to the utility management of a village water or sewer system, including ordinances, user agreements, policies and procedures for collections, incentive and enforcement, rate studies, customer surveys, and facility or financial planning.

VSW – Village Safe Water (Alaska Department of Environmental Conservation)

Chapter I. Introduction

The Alaska Native Health Board (ANHB) has a multi-year project funded by the U.S. Environmental Protection Agency, Office of Wastewater Management, to administer sanitation facilities operations and maintenance (O&M) demonstration grants in rural Alaska. Nine projects were funded in the first wave, beginning in April 1996. Nineteen projects, including two carry-overs from the first wave, were funded in the second wave, which started in April 1997. The third and last wave, with seven projects, started in April 1998.

The Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage is monitoring and evaluating the individual sanitation facility O&M projects and the program overall. EPA initially funded this work; it is now funded by ANHB. The research design and the underlying program design differ somewhat across the three phases. This report comprises the final evaluation for the sixteen Phase II community projects for which data collection was substantially complete as of September 30, 1999.

Phase II Communities

In 1997, 68 rural communities prepared grant applications for Phase II project funding. The project's Coordinating Committee identified priority themes for funding and recommended a mix of applications addressing each theme. ANHB selected 18 applications for Phase II funding and offered two Phase I communities continuation funding. Table 1 describes the four Phase II themes and shows the projects by theme.

Map 1 shows the sanitation status of 191 Alaska villages, highlighting the 20 selected for Phase II O&M projects. The communities and their current water and sewage technologies are further described in Table 2. The communities range in population from 85 to 803. Numbers of households served vary from 44 to 184. The average household size varies from 2.7 to 5 persons.

The communities also differ in their ability to pay for utility services. The 1990 median household income in the twenty communities ranged from $12,083 to $34,531. In nearly half the study communities, a quarter or more of the households had 1990 incomes of less than $10,000. Table 3 shows the distribution of the 20 communities, by sewage technology and by percentage of households with 1990 incomes of less than $10,000. It is not surprising that the poorest communities have the least sophisticated technology. The communities with more income are more diverse technologically and geographically.

TABLE 1. PRIORITY THEMES FOR SELECTION OF THE 1997 O & M PILOT PROJECTS

Utility Management Structure
- Hiring a utility manager
- Establishing a utility board

Utility Management Education
- Training for mayor, administrators, council members
- Training for utility board members
- Training for utility manager, clerk or other staff

Utility Management Procedures, Systems, and Resources

Customer Education
- Need for utility fees or other means of financial support
- Homeowner responsibilities for O & M
- Orientation to new sanitation system

O & M Pilot Project Community	Utility Management Structure	Utility Management Education	Utility Management Systems And Resources	Customer Education
Chefornak			x	
Deering		x	x	x
Galena			x	
Kiana	x			x
Kongiganak				x
Koyukuk	x	x		
Mekoryuk	x			
Napaskiak	x			
New Stuyahok		x	x	
Noatak		x		
Nondalton			x	x
Nunapitchuk			x	
Saint Michael		x	x	
Shaktoolik		x		x
Shishmaref				
Tanacross	x			
Stebbins			x	
Tanana	x			
Unalakleet	x			
Venetie	x	x		

Map of community sanitation facilities is in separate PDF file.

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TABLE 2. STUDY COMMUNITIES

Community	Regional Health Corporation	Water & Sewer Operator	1997 Population	1990 Mean Household Size	1990 Median Household Income	1990 Percent Below $10,000	Water System (Number of households served)	Sewage System (Number of households served)
Chefornak	NSHC	city	405	5.00	$20,278	17%	watering point (90)	honey bucket haul (85)
Deering	Maniilaq	public util.	158	3.57	$15,208	10%	watering point (44)	honey bucket (44)
Galena	TCC	city	543	2.79	$28,611	13%	FHT (97), piped (28),watering point (75)	FTH (115), septic (36),honey bucket (38), outhouse (13)
Kiana	Maniilaq	city	415	4.23	$28,125	30%	piped (76), watering point (8)	sewer (73), FTH (6), honey bucket (6)
Kongiganak	YKHC	tribe	349	4.90	$33,250	25%	watering point (75)	honey bucket (73), community haul (2)
Koyukuk	TCC	city	126	3.15	$13,929	38%	watering point (45)	honey bucket, outhouses
Mekoryuk	YKHC	city	192	2.81	$14,792	26%	watering point (64), piped (34), FTH (30)	honey bucket (34), sewer (31), FTH (30)
Napaskiak	YKHC	tribe	399	4.43	$18,750	24%	watering point	honey bucket
New Stuyahok	BBAHC	city	452	4.44	$12,083	18%	piped (85), watering point (1)	FTH (80)
Noatak	Maniilaq	tribe	401	4.50	$36,458	7%	piped (70)	sewer (70)
Nondalton	BBAHC	city	221	3.30	$21,750	20%	piped (75)	sewer (69), septic tanks (10)
Nunapitchuk	YKHC	city	489	4.34	$17,083	19%	haul (6)	flush haul (6)
Saint Michael	NSHC	city	341	4.28	$23,194	18%	watering point	honey bucket
Shaktoolik	NSHC	city	226	3.87	$18,438	8%	piped (44)	sewer (44)
Shishmaref	NSHC	city	542	3.83	$15,625	30%	watering point, haul (20)	honey bucket (), flush haul (20)
Stebbins	NSHC	city	475	4.65	$23,333	27%	watering point (79)	honey bucket hand (79)
Tanacross	TCC	tribe	85	3.03	$14,750	25%	piped (26), watering point (21)	septic tanks (24), honey bucket (19), outhouse (12)
Tanana	TCC	public util.	299	2.70	$17,000	34%	watering point.	outhouses
Unalakleet	NSHC	city	803	3.45	$34,531	9%	piped (184)	sewer
Venetie	TCC	tribe	241	3.64	$14,688	39%	watering point (73), piped (12)	outhouses (73), sewer (12)
mean			361	3.73	$20,757	24%		

Source: *Alaska Department of Community and Economic Development community database and project applications*

TABLE 3. STUDY COMMUNITIES BY INCOME AND SEWAGE TECHNOLOGY

Percent of Households Below $10,000 Income	Sewage System: Piped	Sewage System: Septic Tank or Flush Haul	Sewage System: Honey Bucket or Pit Latrine
Less than 21 percent	(Galena) Nondalton Unalakleet	Galena New Stuyahok (Nondalton)	Chefornak Saint Michael
21 percent – 30 percent	Kiana Noatak (Mekoryuk) Shaktoolik Tanacross	(Mekoryuk) (Nunapitchuk)	Deering Kongiganak Mekoryuk Napaskiak Nunapitchuk
More than 30 percent	(Venetie)	(Shismaref) Tanana	Koyukuk Shismaref (Tanana) Venetie

Note: Several communities have more than one system. A community name in parentheses under a system type indicates that fewer households use that system.

Program Implementation

Five ANHB staff members visited the demonstration communities and worked with them to prepare partnership agreements. While the dates of these visits ranged from March to November 1997, two-thirds of them were completed in May. Before each visit, the ANHB staffers coordinated with the various federal, state, and regional agency staff (remote maintenance workers, public health service engineers, and rural business advisors) who provide technical assistance to each community for water and sanitation management, operations, and maintenance. Over two or three days, ANHB staff talked with community personnel to understand community needs, assess options, and facilitate planning sessions to prepare draft work plans (scope of work) and budgets.

Half the communities had completed work plans and budgets and signed O&M Pilot Project Partnership Agreements with ANHB and were ready to start their projects by July 1, 1997. The remaining communities took a little longer to complete these tasks, with the last project in the group starting November 1, 1997. Stebbins never completed a work plan or partnership agreement and was dropped from the program in December 1997.

Under the terms of the partnership agreements, the communities were obligated to submit quarterly reports of their activities. There was also extensive follow-up communication and problem solving by telephone with ANHB. All but three of the communities received second site visits from ANHB. Two ANHB staffers made these second visits, all of which except two were between January and May 1998; the earliest visit was in November 1997 and the last was in April 1999. Many of the communities experienced delays in implementing their projects. In some cases, the scope of the project was revised part way through. Twelve of the twenty communities were given extensions of one or more quarters. Four community projects were extended into the fall of 1999 and are not yet closed out. One community was dropped from the project. Fifteen communities completed their projects and were closed out. The

project start and end dates, award amounts, percentage of awards actually claimed, and community matches for the twenty Phase II communities are shown in Table 4.

This report focuses on the fifteen completed projects, plus Shishmaref, because, although that project has been extended, Shishmaref has a very rich data record.

TABLE 4. PROJECT FUNDING AND DURATION

Community	Project Start Date	Project End Date	Total Award	Percent Claimed	Community Match* as of 9/30/99
Chefornak	7/1/97	9/30/98	$15,915	100%	$25,087
Deering	10/1/97	extending	$34,700	75%	$10,256
Galena	7/1/97	6/30/98	$12,000	100%	$17,000
Kiana	7/1/97	9/30/98	$40,000	100%	$54,064
Kongiganak	11/1/97	10/31/98	$40,000	100%	$15,860
Koyukuk	8/1/97	7/31/98	$40,000	100%	$20,080
Mekoryuk	9/1/97	11/30/98	$37,083	71%	$17,221
Napaskiak	7/1/97	6/30/98	$40,000	100%	$32,541
New Stuyahok	10/1/97	3/31/99	$40,000	100%	$9,957
Noatak	7/1/97	6/30/98	$40,000	100%	$81,411
Nondalton	7/1/97	12/31/98	$35,286	100%	$30,575
Nunapitchuk	10/1/97	9/30/99	$40,000	100%	$26,392
Shaktoolik	7/1/97	6/30/98	$39,968	100%	$18,154
Shishmaref (2nd yr)	12/1/97	11/30/99	$20,000	25%	$4,045
St. Michael	11/1/97	10/30/99	$38,044	68%	$2,374
Stebbins	-	12/12/97	$39,000	0%	-
Tanacross	7/1/97	12/31/98	$28,475	100%	$13,216
Tanana (2nd yr)	10/1/97	9/30/98	$20,000	100%	$26,432
Unalakleet	7/1/97	12/31/98	$35,000	90%	$31,571
Venetie	8/1/97	7/31/98	$37,271	25%	-
TOTAL			**$672,742**	**88%**	**$436,236**

*Any non-federal services or funds the community used to manage, operate, and maintain the sewer and water system during the project year. Documentation was supplied by each community.

Chapter II. Evaluation Methodology

Multiple Case Study Design

For the project evaluation, we are using a multiple case study research design. Case study research is the preferred design for three reasons: (1) our primary research questions are exploratory and explanatory (what, how, and why); (2) the phenomena we are studying are complex and context dependent; and (3) we have many more variables of interest than we have data points. We use similarities and systematic differences across case study communities to strengthen the analytic conclusions we draw.

Research Questions

The ANHB program goals as set out in the initial grant proposal are to:

- protect the public health of rural Alaskans through effective water and sanitation facility operation and maintenance
- protect government and community investments in sanitation facilities
- build community capacity for operating and maintaining sanitation facilities
- demonstrate the feasibility of reducing life-cycle costs through alternative technologies

The major themes for Phase II projects emphasizing utility management and public education squarely address the third ANHB goal—building community capacity for operating and maintaining sanitation facilities. The project themes indirectly serve the first two goals: improved management and finances facilitate improved operations and maintenance—which in turn protects public health and public investments. For all three goals, improving operations and maintenance is the key outcome we'll use to measure program success. As a secondary measure of community capacity for O&M, we'll also track improvements in financial self-sufficiency.[1]

The two general research questions we address for all study communities are:

- Has the demonstration community, as a result of this program, improved its operations and preventive maintenance?
- Has the demonstration community, as a result of this program, become more financially self-sufficient in operating and maintaining its sanitation systems?

These general questions can be broken down into many subsidiary questions, as shown in Table 5. We use all sixteen community project evaluations to address some larger research questions, which are also detailed in Table 5:

- What interventions work to improve O&M?
- Can these models be extended to other rural communities throughout Alaska?
- Was the O&M pilot program successful in moving us toward long-term solutions to rural O&M problems?

[1] To address the fourth goal, ISER is preparing, as a separate study, an analysis of the life-cycle costs of flush-haul technology.

TABLE 5. RESEARCH QUESTIONS

I. Within-case research questions:

A. Has the demonstration community, as a result of this program, improved its operations and preventive maintenance?

1. Did the O&M indicators change over the period?

a. Was there a change in operator hours or in the percentage of scheduled maintenance activities completed?

b. Was there a change in policies, procedures, or planning in support of O&M?

c. Was there a change in operator skills or resources for O&M tasks?

d. Was there a change in operator attitude or perceptions of community support?

e. Was there a change in the physical condition of the facilities?

2. Did the program interventions cause the change?

3. What about the interventions caused the change: the intervention itself, or the implementation process?

4. How did the implementation work?

5. What were the important factors in determining program outcomes: key individuals? community organization? community composition or social structures? outside assistance or catalyst? program philosophy of community empowerment?

B. Has the demonstration community, as a result of this program, become more financially self-sufficient in operating and maintaining its water and sewer systems?

1. Did the financial indicators change over the period?

a. Have collections increased?

b. Have savings been realized?

c. Was there a change in utility finance policies, procedures or planning?

d. Was there a change in financial management skills or resources?

2. Did the program interventions cause the change?

3. What about the interventions caused the change: the intervention itself, or the implementation process?

4. How did the implementation work?

5. What were the important factors in determining program outcomes?

C. How might these changes improve public health, protect facility investments and build community capacity?

II. Cross-case research questions

A. What interventions work to improve O&M?

1. Were the successful interventions successful across different types of communities?

B. Does community initiative and control contribute to program success?

C. Can these findings be generalized?

D. Did the O&M pilot program move us in the direction of long-term solutions to rural O&M problems?

Data Collection

Successful operation and maintenance of rural sanitation facilities can be broken into four dimensions: operations, management, finance, and community support (Figure 1). Each of these in turn can be broken into components. To measure improvements in O&M, we attempted to collect information on each of the ten O&M program components shown in Figure 1. We augmented these O&M indicators with information on community context and project implementation to address the other research questions in Table 5. We collected qualitative and quantitative information from the 16 communities and secondary sources:

- *Background information*: community profile, demographics, history and description of water and sanitation systems
- *Project implementation*: plan, objectives, and description of implementation process, problems, and successes
- *Operations*: operator training, turnover, hours and pay, O&M activities, O&M plans and procedures, resources and equipment
- *Management:* manager training, hours and pay, administrative tools and systems, planning and analysis activities
- *Finance*: fees, billings, collections, expenses, record keeping, reporting
- *Community support*: formal policies, community education, and community attitudes

FIGURE 1. PROGRAM COMPONENTS FOR OPERATION AND MAINTENANCE OF RURAL SANITATION

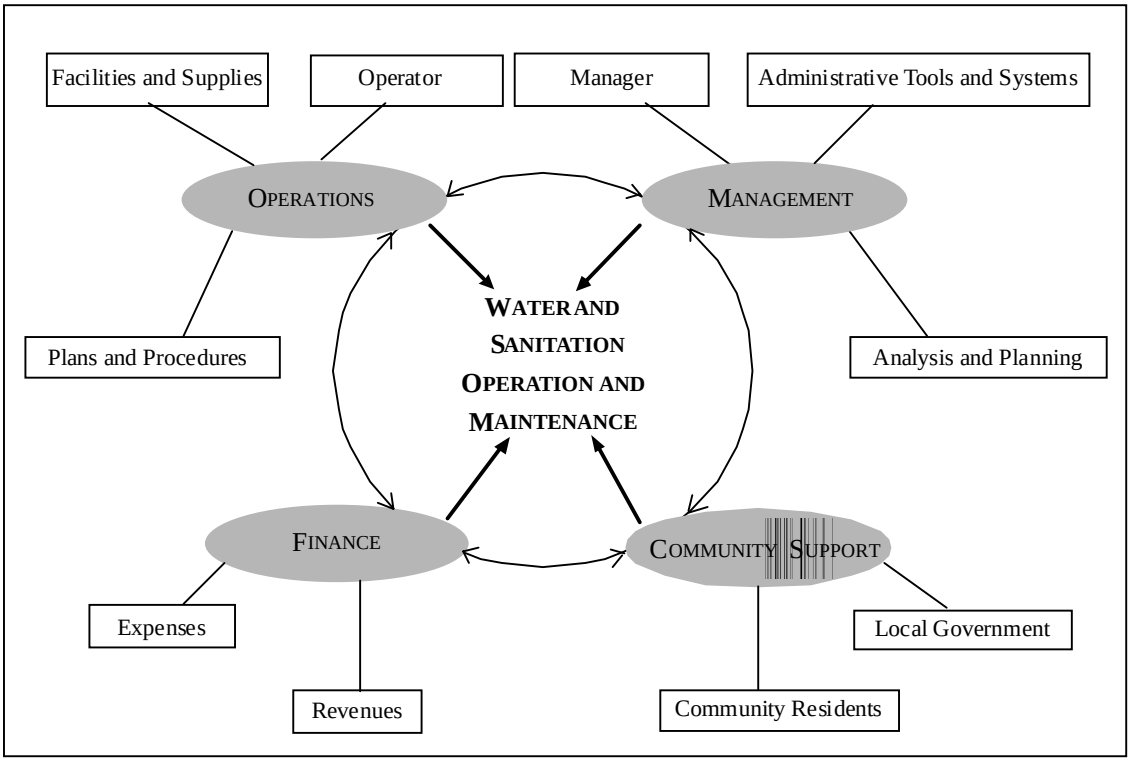


Table 6 identifies the sources for each of the data clusters in Figure 1. The sources are described further below.

Community Survey and Community Records

We tried to collect about the same data for Phase II communities as we had for Phase I, but we used a different strategy. In Phase I we relied on the communities to voluntarily complete the community survey and attach the requested documents as part of their agreement with ANHB. But submittal of the surveys and supporting information (such as fee collections or policy information) was spotty. For Phase II, we negotiated separate data collection contracts directly between ISER and the project communities. We also asked the communities to play a greater role in the evaluation, assessing for themselves whether the O&M indicators had changed and why, and writing, reviewing, correcting and updating portions of the report.

The community survey is a 12-page structured questionnaire (Appendix A). It requests information as of May 1997—and in some cases, two years of history—about operations, maintenance, finances, utility operators, utility managers, and community education about the local water and sanitation systems. Several questions ask the contractor to attach supporting documents, such as copies of ordinances and policies, fee schedules, maintenance records, or job descriptions. This information serves as a reference point for assessing the outcomes of the pilot projects. Even with structured payments for data the communities supplied, we received only twelve pre- and eight post-project surveys.

Data Gap Interviews

Because we had too few responses to our community survey from July through September 1999 to complete the analysis, we conducted telephone interviews of project managers in each community, soliciting missing data for key indicators essential to the evaluation design. A copy of the survey appears in Appendix B.

Other Community Information

Part B of the data collection contract specifies seven writing and editing tasks, asking the contractors to correct and update the community profile information and to describe the water and sanitation systems, operations and maintenance activities, finances, community attitudes toward service, and the project application process. Part C requests quarterly reports documenting current system finances from July 1997 through June 1999. Part D asks the contractors to assess, after completion of the project, the changes resulting from the project. Part E asks the contractors to update the information provided in Part B as of March 1999. Part F asks the contractors to update the information provided in the community survey as of May 1999 and to update their assessments of project effects under Part D. These dates refer to projects that started July 1, 1997; we adjusted dates for projects that started later.

Field Notes, Phone Logs, and Project Documents

The ANHB staff members who visited each of the communities are key informants in this study. Their field notes are a primary source of information describing project implementation in each community. With the research questions in mind, the staffers were asked to record their observations and interpretations during their trips to negotiate the partnership agreements, as well as during follow-up contacts throughout the project. Phone logs project staff kept are valuable sources of information on project implementation. Project documents such as the community interest form, the project application, the cooperative agreement, and quarterly reports are also primary data sources.

Operator Interviews

Another primary means of data collection was a structured telephone interview of utility operators in each community. We interviewed 26 operators in May 1997 and conducted repeat interviews with each of them or their successors in June and July 1999. The questions were about work hours, duties, availability of tools, materials and parts, operator attitudes, and support from the community council, supervisor, and residents. A copy of the survey instrument appears in Appendix C.

State Program Records

The Rural Utility Business Advisor (RUBA) program in the Alaska Department of Community and Economic Development offers technical assistance and training for rural communities about the business and financial administration of their utilities. The RUBA advisors are assessing the budgeting, record keeping, and accounting practices in most of the pilot communities, as well as the proficiency of community personnel. Their reports supplement our data on the financial operations of communities and their utilities and in particular the unique training needs of each community. In the spring of 1999, the RUBA program began a survey of utility operations, finances, accounting systems, management organization, personnel and policies. We included in our data ten surveys from project communities.

The Department of Community and Economic Development (DCED) also maintains an online Alaska Community Database. It includes descriptions of communities and their facilities, data from the U.S. census, and information from other government sources on community economies, employment, schools, businesses, municipal finances, rural grants, and ANCSA land status.

DCED collects revenue and expenditure data from the certified financial statements of municipalities throughout the state. For each project community that is incorporated, we have up to ten years of financial data on enterprise (utility) funds. Our analysis of this data will be limited, however, due to the lack of detail by utility and inconsistencies in reporting.

We also use records of community water sampling that the Drinking Water Program in the Alaska Department of Environmental Conservation's Division of Environmental Health keeps. The Rural Issues Program of the Department of Environmental Conservation performed an environmental assessment in three of the project communities. The reports provide detailed observations on drinking water, wastewater, solid waste, hazardous materials, pollution prevention, and fuel tank farms.

Remote Maintenance Worker Assessments

We asked the eight remote maintenance workers (RMW) and IHS operations and maintenance program specialists who work with the selected communities to complete short assessments of facility condition. Because of the poor response rate, we revised our data collection design to include focus groups for the RMWs and RUBAs.

Remote Maintenance Worker and Rural Utility Business Advisor Focus Groups

Responding to comments from the Coordinating Committee on the Phase I report,[2] and because of the low response rate noted above, we revised the evaluation design to include overall data collection from remote maintenance workers (RMWs) and rural business utility advisors (RUBAs). Nine RMWs attended a dinner meeting in May 1999; twelve RUBAs participated in a teleconference discussion in June 1999. Following a short written questionnaire about perceived changes in indicators for both project and control communities, facilitators asked participants to explain their observations and opinions. Copies of the questionnaires and discussion guides, along with a list of participants, appear in Appendix D.

Overall Evaluation Interviews

In addition to the above efforts to document project outcomes, we conducted telephone interviews with all community project managers about their experiences with the ANHB grant program. Questions addressed whether and how the program helped them with long-term O&M and how ANHB and other agencies could better serve them. The interviews were scheduled after project close-out, and ranged from July 1999 through September 1999. A copy of the overall evaluation questionnaire appears in Appendix E.

[2] Evaluation of the Alaska Native Health Board Sanitation Facility Operation and Maintenance Program: Final Report on Phase I Projects, ISER, April 1999.

TABLE 6. DATA SOURCES

Data	Community Survey	Community Information	Project Documents	Field Notes & Phone Logs	Operator Interviews	RMW and RUBA Focus Groups	RUBA Reports	Data Gap Interview	Community Data Base
Background Information									
Community profile	x	x							x
Water and sanitation systems	x	x							
Project implementation									
Plan and objectives			x						
Implementation process	x	x	x	x					
Operations									
Operator job	x	x		x	x	x		x	
O & M plans and activities	x			x	x	x			
Management									
Manager job	x					x			
Planning activities	x		x	x		x			
Finance									
Fees, billings and collections	x	x				x		x	
Record keeping and reporting	x					x		x	
Revenues and expenses	x						x	x	
Community Support									
Formal policies	x								
Community education	x								
Community attitudes	x	x		x					

Data Analysis

We compiled the hard-copy data collected for each community in three-ring binders. The analyst read through the record, key entering data elements into an Access database. The completed database could then be queried to report data organized by any key variable, including community name, demographics, source of data, indicator type, activity type, or research question.

The RMW and RUBA focus groups were recorded, transcribed, corrected, and read into a Nudist database. The database was then coded by community, source, question, and theme. The completed database could then be queried to report data organized by any key variables, including community name, source, indicator, theme, or question. The written RUBA and RMW questionnaires were tallied in an Excel spreadsheet.

The overall evaluation interviews were key entered verbatim into an Excel spreadsheet, allowing the responses to be readily compared and summarized by question across community.

Chapter III. Project Activities and Outcomes

Table 7 summarizes the types of activities undertaken in these sixteen communities. Based on their experience from Phase I, ANHB staff encouraged all the communities to make partnership team building an activity in their work plans. The popularity of utility management and customer education activities reflects the priorities of the Coordinating Committee in selecting projects for funding, as well as an increasing perception in communities and agencies that these strategies pay off.

Project Data

Table 8 reports changes in outcome indicators for all communities; the unshaded cells are changes attributed to the pilot projects. Tanana and Tanacross undertook and—if we consider that the intent of the Tanana work plan was to maintain, not increase the first three O&M indicators—achieved the broadest range of improvements. Shishmaref and Shaktoolik also improved on all relevant indicators, with Napaskiak and Nondalton close behind. All communities that implemented projects showed improvements.[3] This table does not indicate the magnitude, scope, or impact of the improvements. Such discussions are included in the individual community descriptions in Volume II.

Improvements in community involvement and support for the utility were the most common project outcomes (10). Improvement in utility management—that is, effective governance and oversight—was a frequent goal among the projects (13), but it was less often achieved (8, or 62 percent). Eight communities were able to improve their financial management. The smaller number of projects (7) aimed at improving the condition of facilities had the highest success rate: 100 percent.

The O&M projects are part of a broader effort, involving other people and resources, to improve water and sanitation in these communities. We would expect project and non-project activities to support each other; indeed, that is the premise of the partnership approach. If we look broadly at all the changes in outcome indicators, whether project-related or not, we find that two thirds or more of the communities showed improvements in operator skills, condition of the facilities, financial management, and support for the utility.

[3] Koyukuk made improvements but failed to sustain them after the project ended. Venetie never implemented its project.

TABLE 7. TYPES OF ACTIVITIES CONTAINED WITHIN THE O&M PROJECT WORKPLANS, BY COMMUNITY

	O&M Activities					Management Structure					Management Systems & Resources					Customer Education		
	Parts & Supplies	Operator Training	Maintenance & Improvements	Operator Support	O&M Planning & Records	Partnership Team	Utility Manager/Clerk	Boards or Committees	City/Tribe Cooperation	**Utility Mgmt. Training**	Financial Management	Billings & Collections and Revenue Enhancement	Office Equipment	Planning	Ordinances & Procedures	Education about Utility Costs	Education about User O&M	**Count**
Chefornak						X				X	X	X	X					5
Galena						X					X			X				3
Kiana	X					X	X			X		X		X				6
Kongiganak	X	X				X		X		X	X					X	X	8
Koyukuk	X	X				X	X			X		X					X	7
Mekoryuk	X	X					X			X	X		X			X	X	8
Napaskiak	X	X	X	X		X			X		X							7
New Stuyahok	X	X				X				X		X				X		6
Noatak	X					X				X			X				X	5
Nondalton	X	X	X			X						X				X	X	7
Shaktoolik	X		X			X	X				X							5
Shishmaref	X	X		X		X				X							X	6
Tanacross	X	X	X	X		X	X			X					X	X		9
Tanana				X	X		X	X	X	X	X			X				8
Unalakleet	X		X		X	X					X	X						6
Venetie	O					O	O				O				O	O		0
Count	12	8	5	4	2	13	6	2	2	10	8	6	3	3	1	5	6	

Legend X Activity in work plan and implemented, at least in part

O Activity in work plan but not implemented

TABLE 8. SUMMARY OF PROJECT OUTCOMES BY COMMUNITY

	Operator Hours	Scheduled Maint.	O&M Planning	Operator Skills	Parts and Supplies	Condition of the Facilities	Cost Efficiency	Collections	Financial Management	Utility Management	Policies & Planning	Community Involvement
Chefornak	↓	-	~	↑	~	↑	-	-	↑	↑	↑	↑
Galena	~	-	~	↓	~	~	-	-	-	~	↑	↑
Kiana	~	↓	~	↓	~	↑	-	↑	↑	↑	~	~
Kongiganak	↓	↓	↑	↑	~	~	↑	↑	↑	↑	↑	↑
Koyukuk	↓	↓	~	~	↓	↓	~	~	↑	~	~	~
Mekoryuk	↑	↑	↑	↑	~	↑	↓	~	↓	~	~	↑
Napaskiak	↓	↑	↑	↑	↑	↑	↑	-	-	↑	-	↑
New Stuyahok	~	~	~	↑	-	↑	-	↑	~	~	~	↑
Noatak	↓	↓	~	~	~	↓	↑	↑	↑	↑	~	↑
Nondalton	~	~	-	↑	↑	↑	↑	-	↑	~	~	↑
Shaktoolik	~	-	~	↓	~	↑	↑	↑	↑	↑	↑	↑
Shishmaref	↑	↑	↑	↑	↑	↑	~	↑	↑	↑	↑	~
Tanacross	~	~	↑	↑	↑	↑	-	↑	↑	↑	↑	↑
Tanana	~	~	~	↑	↑	↑	↓	↑	↑	↑	↑	↑
Unalakleet	↑	↑	~	↑	↑	↑	↑	↓	↑	~	↑	↑
Venetie	~	~	~	↑	0	~	0	0	0	0	0	0

Legend:
- ↑ Improvement
- ~ About the same
- ↓ Decline
- 0 Project not implemented
- - Unable to determine
- These outcomes are outside the scope of the O&M project workplan

Note: Detailed information explaining project outcomes is provided in the text and tables in Volume II.

RMW and RUBA Observations

Table 9 shows the assessments, for some communities, of the RMWs and the RUBAs about changes in O&M and financial management indicators from June 1997 to May 1999. Unfortunately, this information was not available for all project communities. In the focus group discussions, the RMWs and RUBAs elaborated on their assessments. The biggest change during the project period, noted by RUBAs both in their questionnaires and their narrative comments in the focus group, was in management indicators. This reflects the emphasis the Coordinating Committee placed on selecting communities that sought to improve their management. While the RMWs noted improvements in some O&M indicators, comparison communities without ANHB grants showed greater improvements in O&M indicators over the same period.

On the whole, there was little net change in operators' hours or percentage of scheduled maintenance completed in project communities. The RMWs noted few specific changes in policy or procedures in any community in support of operations and maintenance. From their discussions, it seems that policies or procedures that had been in place before the project were implemented or enforced. In many project communities, a portion of ANHB funding was used to buy critical spare parts that were used to improve the condition of the facilities, thus increasing the availability of parts—as noted in the RMW responses to the questionnaire. However, the RMWs focus group discussion pointed out that no communities increased and maintained their inventories of critical spare parts; when the next breakdown occurs, they will have to wait for vital parts to be ordered and shipped. RMW focus group participants noted some improvements in operators' skills.

Responses to the RUBA questionnaires showed that six project communities increased collection of utility fees. These were Nunapitchuk, Kongiganak, Tanana, Tanacross, Shishmaref and Shaktoolik. For the few communities (Tanana, Shaktoolik, and Shishmaref) discussed in the focus group, RUBAs attributed the increase primarily to the hiring of persons who were competent, skilled, or aggressive in collections. Also, a variety of administrative and operations and maintenance activities potentially strengthen and support future collections. Tanacross set fees, developed a collection policy, and implemented user agreements. Koyukuk set up a billing and collection system for households; it had previously been collecting only from the school. Nondalton retrofitted its water system with shut-off values, so it could turn households' water off as a part of collection enforcement. And the RUBAs noted increases in customer knowledge about the need to improve collections and to have users' fees. All these changes were the result of O&M pilot projects.

It appears that communities with increased revenues used these funds for current utility activities. They did not set savings aside for parts, emergencies, or capital expenses. They used any additional dollars to pay for current utility management, maintenance and operation.

Local management skills, systems, and resources also appeared to improve. RUBA staff noted that improvements in financial policies, procedures, and planning were often tied to the hiring of new, competent persons in utility management positions—for example, tribal administrator, bookkeeper, city administrator, or city clerk—particularly in communities with clear shared ideas of what they wanted to achieve. Examples of these include Tanacross's bookkeeper, Shishmaref's clerk, Noatak's utility manager and Shaktoolik's clerk.

TABLE 9. CHANGES IN INDICATORS REPORTED BY RMWS AND RUBAS, BY PROJECT COMMUNITY

	RMW					*RUBA*			
	Operator Hours	**Percent of Maintenance Activities Completed**	**Operator Skills**	**Availability of Parts and Supplies**	**Condition of Facilities**	**Utility Fee Collection**	**Cost Efficiency in O & M**	**Management Skills, Systems or Resources**	**Utility Policies, Procedures or Planning**
Cherfornak	-	-	-	-	-	-	-	-	-
Deering	~	↓	↓	↓	↓	-	-	-	-
Galena	~	~	↓	~	↑	-	-	-	-
Kiana	~	↓	↓	~	~	-	-	-	-
Kongiganak	-	-	-	-	-	-	-	-	-
Koyukuk	↓	↓	~	↓	↓	↑	↑	↑	↑
Mekoryuk	-	-	-	-	-	~	~	↓	~
Napaskiak	↓	↑	↑	↑	~	-	-	-	-
New Stuyahok	~	~	↑	↑	↑	~	-	~	~
Noatak	~	~	~	~	~	-	-	-	-
Nondalton	~	~	↑	↑	~	~	↓	-	-
Nunapitchuk	~	~	↑	~	↑	↑	-	↑	↑
Saint Michael	↑	~	↑	~	~	↓	↓	↓	↓
Shaktoolik	~	↑	↓	~	~	↑	↑	↑	↑
Shishmaref	↑	↑	↑	↑	↑	↑	~	↑	~
Stebbins	~	~	↓	-	~	-	-	-	-
Tanacross	~	~	↑	↑	↑	↑	↑	↑	↑
Tanana	~	~	~	↑	↑	↑	↑	↑	↑
Unalakleet	↑	↑	↑	↑	↑	~	~	↑	~
Venetie	↓	~	↑	↑	~	-	-	-	-

Legend: ↓indicator declined ↑ indicator improved ~ indicator stayed about the same - don't know or information not available
These outcome indicators are outside the scope of the project workplan.

The ANHB funds in some project communities paid for upgrading computers and financial software. With assistance from the RUBA program, these communities improved their skills and resources. Unalakleet is a good example, as are Nunapitchuk and Nulato.

RMWs and RUBAs participating in the focus groups highlighted the following improvements they saw as a result of the O&M pilot program.

- Tanana used ANHB funds as seed money for establishing an independent utility, while it focused Village Safe Water funds on capital improvements to the facilities. ANHB funds paid for administrative overhead while the system was under repair and Tanana was unable to collect user fees. It expected to collect more revenue from customers, through increased collections, once the repairs were complete. This increased revenue would also provide support for operators and managers previously funded by the ANHB grant.
- Shishmaref saw ANHB funds as a catalyst for improving morale, community support, and teamwork (among the RUBA, RMW, city administrator, clerk, operator, and regional sanitarian). This improved relationship made the community and the city administration realize that if they worked together with these utility funds, things would improve in the community. More teamwork also helped Shishmaref acquire a large capital grant for improving its water and sewer system. These capital improvements represent some long-term change and benefits. In this case, good management supported by a little money (the ANHB grant) was leveraged for a lot more money and long-term improvements.
- Nunapitchuk, Unalakleet , and Nulato bought additional computer equipment and financial software so they could prepare better and more timely utility management reports. These communities already had the basis of a good system. New equipment and some training allowed them to focus on particular items that improve utility management.
- Nondalton used ANHB funds to retrofit its system with shut-off values, so it could enforce collection policies in a fair and equitable manner.
- Tanacross used ANHB funds to order and install critical parts for its water system and washeteria—which in turn gave the community a chance to increase service (laundry) and generate more revenue (user fees from the washeteria).

Chapter IV. Cross-Case Questions

In this section we address the cross-case research questions originally posed in Table 5:

- What interventions work to improve O&M?
- Do community initiative and control contribute to program success?
- Can these findings be generalized?
- Did the O&M pilot program move us toward long-term solutions to rural utility O&M problems?

Tables 8 and 9 provide a little information about which projects worked, but for several reasons it is very crude information. Both tables indicate the *direction* of change in key indicators, but not the magnitude, scope, or implications of change.

The outcome indicators in Table 8 summarize our reading of the data record before and after the pilot project and our understanding of project activities and effects. Still, a tabulation across indicators shows more about the types of activities undertaken than about the degree to which those activities were successful. A close reading of the narrative record for each community (Volume II) provides much more insight about which projects worked and why.

The data in Table 9 are assessments by people with first-hand knowledge about some—but not all—of the communities. Furthermore, in some cases the current RUBAs or RMWs may not have been in a good position to observe the situation two years ago and to make robust comparisons with the present. Their assessments may to some degree represent the community's current level of performance, rather than the net change in performance over time. Also, these changes can't be clearly linked to project activities.

Our data differ from the RUBA and RMW assessments, because we used multiple data sources, including community interviews and project records in 1997 and 1999, and because our data set is substantially complete for all 16 communities examined in this report.

How Did Project Success Vary Among the Communities?

Most Broadly Successful

Measured by the broad program goals of building long-term community capacity for effective O&M, the four most successful projects were in Shaktoolik, Tanana, Unalakleet, and Shishmaref. What these communities have in common is leadership, commitment, and a broad base of support.

Shaktoolik had a broad base of leadership and skills to draw on, from a forward-looking city council and capable staff to a strong partnership with RUBA. A city council member drafted a well-thought-out work plan before ANHB staff visited. The mayor, city council, city clerk, utility clerk, utility operator, RUBA, and LGS all worked together to tackle the issues one by one. ANHB grant funds were critical to hiring the utility clerk, performing sewer maintenance, and conducting house-to-house customer education. Everyone was committed to the improvements. Individual skills varied, but the chain didn't break: even with turnover in key positions—the mayor, utility clerk, and operator of ten years—project implementation slowed but did not falter.

In Tanana, water and sewer systems were the number one priority. In 1996 the city and tribe were already working to consolidate water and sewer operations in one non-profit corporation, with the goal of constructing a new piped system. A number of outside agencies have supported and invested in that effort, including RUBA, VSW, TCC, RMW, as well as VSW-funded engineering and business consultants. The ANHB grant supported the utility manager position during this transition period. The manager was very capable and a key component of their project's success. Unfortunately, with delays in bringing the new system on line, revenues have not increased enough to fund the position without the grant, even though collections are at 100 percent. It is unclear how well the utility will fare without a manager.

The best turnaround story is Shishmaref. Shishmaref began the project with poor management and administrative capacity and massive debt. But because of the community's focused desire to fully implement the planned flush-haul system and the willingness of managers and administrators to work through internal problems and with outside agencies, the community made major gains in its capacity to operate and manage the utility. There were many challenges and strained relations along the way, but as these were addressed one by one synergy developed between the council, city staff, and outside agencies. As the council steadily improved its understanding of utility management, it was able to make effective decisions and provide leadership and oversight for the staff. As the new clerk worked with RUBA to learn bookkeeping and financial management skills, and as she gradually resolved the financial problems she had inherited, she was able to provide more and better information to the council and respond more quickly to the operator when he wanted to order parts. The ANHB grant—which provided money for parts—and the focused support of the new RMW greatly improved the operator's productivity and morale. While many challenges remain, including technical problems with the flush-haul system, very high O&M costs, and high staff turnover, it appears that the gains in administrative capacity are enduring.

Unalakleet is the largest of the project communities and, as the headquarters for the Bering Straits School District, has a comparatively well-paid and well-educated work force. This community has the most sophisticated management and accounting system in the group, as well as the oldest and largest piped water and sewer system. Unalakleet does not need management coaching—just money to maintain its aging system. Hence, it has a close working relationship with VSW, but not with RUBA. Unalakleet's broad pool of skills and leadership and high level of organizational development enabled the community to complete its project smoothly, despite turnover in every city position associated with the project.

Least Successful

The five least successful projects were in Koyukuk, Kiana, New Stuyahok, Venetie, and Stebbins. What the first four have in common is lack of consistent leadership and follow through. The fifth, Stebbins, did not even follow up on ANHB's award of grant money. The administrator was never able to get the council to work with her on a work plan and partnership agreement. After a site visit, many phone calls and several letters from ANHB, Stebbins was dropped from the program in December 1997.

Venetie illustrates lack of leadership commitment to improving water and sanitation. After six months of intermittent contacts by ANHB staff, the village council did hire a utility manager. But there was no supervision of the manager and no evidence in the record of any work activities undertaken. Following tribal elections, the priorities of the First Chief changed. ANHB offered to revise the work plan accordingly, but Venetie did not follow through.

New Stuyahok's plan to computerize and systematize billing and collections failed, apparently due to staff no-shows for training, followed by unresolved scheduling conflicts between RUBA visits and the fishing season. The community's modest effort at customer education was not enough to raise collection rates significantly above the historic trend of 10 to 25 percent. In developing the work plan, community leaders passed up the idea of installing curb stops to enable them to enforce collections. The city administrator seemed to be more interested in the ANHB grant as a revenue source than as an opportunity to solve tough problems. The city is at a very low level of administrative development and does not take advantage of the development assistance outside agencies offer.

Koyukuk's basic problems were turnover, turmoil, and leaders leaving the village. Because the city could not demonstrate the required financial and management capacity, the planned flush-haul system was postponed. Without a flush-haul system, the work plan activities no longer made sense. While the record is very thin, it appears that the ANHB funds may have been spent on washeteria operations and billing and collections for electricity.

Kiana also suffered from isolated leadership and high turnover. The community had four administrators over two and a half years, plus turnover in the city clerk and both operator positions during the project period. The utility manager was laid off when the grant money ran out. There also appeared to be a lack of support and involvement from the council. The city administrator and city clerk attended utility management training just prior to the ANHB grant, and used their new learning to draft a model work plan. But the work plan was "by the book," not an organic outgrowth of local leaders' understanding and priorities. Much of the work plan was never completed, due in part to lack of consistency in supervision and support from either the council or the administrator. When the utility manager did propose a collections incentive found successful in other villages, the council did not approve her recommendation.

Limited Success

Chefornak, Kongiganak, and Mekoryuk had limited success with the project. With help from RUBA, Mekoryuk made gains in financial management capacity but could not sustain them. High turnover in the city clerk position and the end of the grant-funded city administrator position undermined local efforts.

Kongiganak and Chefornak are similar to Koyukuk in that their work plans focused on building administrative capacity for new systems—but when the new systems were delayed, the work plan tasks no longer fit. Between turnover in key positions, slow evolution of circumstances, and ANHB's failure to talk to community leaders about the changes and to encourage them to re-assess their priorities, Kongiganak's work plan was never revised. The project nevertheless did provide operator training, management training, improved accounting, improved collections, and customer education about the old system. Chefornak started at a very low level of administrative capacity and made solid gains in developing an accounting system and in management training and organization. The largest gains did not come from the ANHB project per se, but from the transfer of water and sewer operations from the city to the tribe, which was able to provide stronger leadership and support for the utility.

Successful but Less Broad

Like the first group we discussed, the final group of projects—at Nondalton, Noatak, Napaskiak, Galena, and Tanacross—were all solidly successful and showed strong leadership. But the implications of their success were narrower in some respects.

Galena is a regional center with good administrative capacity—including a city GIS database. The community hosts an innovative boarding school and Internet-based distance education school as well as an Air Force base. Galena's city leaders knew exactly what they wanted to do with the ANHB grant: they conducted a customer survey, rate study, and engineering study—which they then used to leverage construction grants.

Nondalton developed a well-focused project and executed it largely by itself. Repairing leaks and installing curb stops enabled Nondalton to save money in operations, enforce collections, and shut off water to homes while occupants were away, preventing freezeups.

The Napaskiak Tribal Council provided consistent leadership, planning, and follow-through to craft innovative, village-appropriate solutions. It consolidated water and sewer operations from the city, purchased and operated a sewage haul unit, and supported it with gaming revenues.

In Tanacross, effective leadership and commitment to improving water and sewer were more concentrated in the tribal administrator. The administrator, who wrote the grant application, had a strong working relationship with outside agencies, a good maintenance supervisor, and a very capable bookkeeper. However, tensions between the administrator and the council led to his departure some months after the project ended. It is unclear whether Tanacross' momentum for improving its water and sewer systems will be sustained.

Noatak is an example of a well-run utility that for the most part did a good job on its O&M project activities, but suffered a major financial setback due to a pump failure and the extraordinary expense of the improvised operations while the pump was being repaired. To cover these costs, the community spent down its reserves, which in turn created a cash flow and budget problem, and eventually a reduction in operator hours. Had the ANHB project occurred a year earlier, Noatak might have had a spare pump in inventory and saved thousands of dollars. But if it had not had the grant at all, it would have been in worse financial straits, further compromising utility O&M. This breakdown illustrates how thin the margin is for many rural utilities: how vulnerable they are to one problem precipitating a chain of problems.

In summary, community commitment to improving water and sewer systems and supporting those systems with local revenues needs to be broad based. Strong leadership is not enough without council support. The RUBA focus group drew the same conclusion: strong and continuous community leadership is a key to success. As one focus group participant observed:

> *Both of these communities (Kiana and Shaktoolik) have RUBA people that were working with them . . . . The only difference [was] . . . in one community the leadership was willing to say yes, we're going to make these changes, yes we want to work, and in the other community there was a lot of turnover in the leadership and the ones who were there weren't really sure they wanted to make . . . changes [or] do anything.*

What Types of Interventions Worked?

> …I think the stronger the support you have from the community, the higher your changes of success are. And again, any kind of knowledge that you can gain through management assistance and utility technical assistance, the better off you are. Having a positive role model fill the spot probably helps. Don't be afraid of the tough days.
>
> MikeAndon, Utility Manager Too'gha (the nonprofit utility in Tanana) *ANHB Closeout Interview*

Success Rates of Activities

To analyze which project activities worked, we look at the outcome indicator data by activity. For each activity in the work plans, and each relevant outcome indicator, we calculate a success rate: the number of communities with that activity that showed improvement in the indicator as a result of the project, expressed as a percent of the total communities with that activity. (Strictly speaking, this measure shows correlation rather than causality, since the improvements might have resulted from other activities.) This is a narrow definition of "success," in that it does not count cases where project activities prevented or mitigated a decline in an indicator.

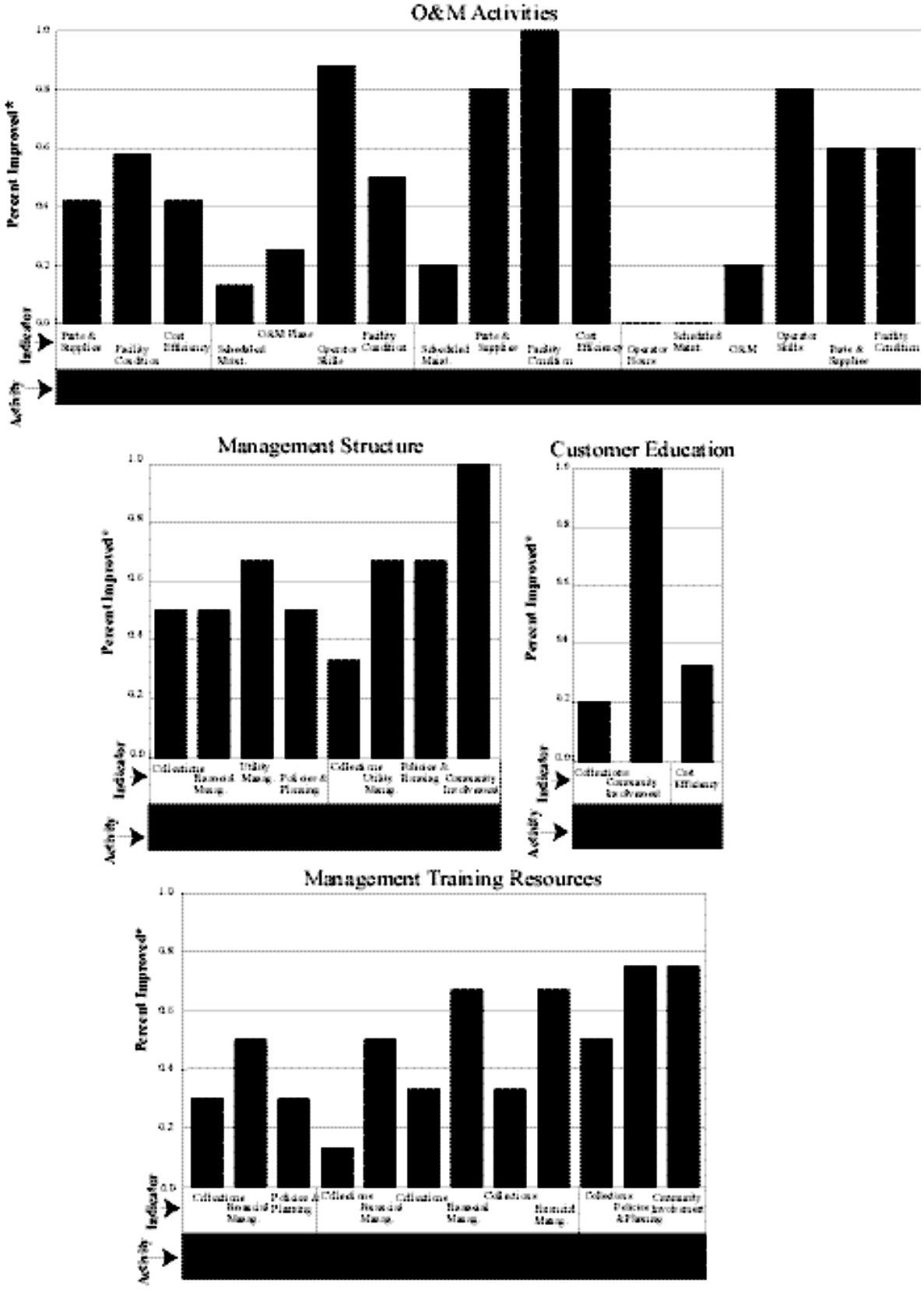
Figures 2 shows the success rates of the various types of activities undertaken. Among O&M activities, the strongest rates of improvement are the most tangible: activities to maintain or improve the facilities did in fact improve the condition of the facilities. Similarly, operator training generally resulted in increased operator skills.[4] (The exceptions were usually due to turnover).

Improvements in operator skills are also correlated with operator support and O&M planning activities. None of the project activities had any significant effect on operator hours, on the percentage of scheduled maintenance activities completed, or on the development of O&M plans and procedures. While purchasing parts and supplies in and of itself seems to have had small net effect on the available inventory of parts and supplies (because they were used and not restocked—see discussion in RMW focus group), maintenance and improvement activities are strongly correlated with net gains in parts and supplies. Maintenance and improvement activities also have a strong effect on lowering operating costs.

The rate of collections is a key measure of success on the utility management side. By this measure, hiring a utility manager or clerk was the most successful activity, followed by activities focused on utility ordinances, procedures, and planning. These activities were broadly successful, showing strong correlation with improvements in financial management, utility governance, and ordinances, policies and procedures. Establishing utility boards or committees and fostering cooperation between the city and tribe showed even stronger success rates, particularly with respect to community involvement and support for the utility. Utility management training did not, by itself, appear to effect much change. Upgrading office equipment, financial management, and billing and collections activities all were more successful at improving utility accounting than at improving collections. Customer education activities strongly improved community involvement and support for the utility.

[4] About half of those trained passed their certification exams.

FIGURE 2. PROJECT-RELATED IMPROVEMENTS



*Percent of communities with the activity showing project-related improvements in the indicator.

Differences With and Without Specific Activities

We can evaluate the effectiveness of project activities another way. We can compare improvements between communities that undertook specific activities and those that did not. For this comparison, we count all improvements, whether project related or not, and deduct any declines. We then divide by the number of communities to calculate a net improvement rate. The difference in rates between communities with and without specific activities can be directly compared. Figure 3 shows the results.

This measure reinforces the earlier findings that facility maintenance and improvement activities make a significant difference in condition of the facilities, cost efficiency, and available parts and supplies; that funding operator training does improve operator skills; and that operator support and O&M planning correlate with increases in operator skills and in the condition of the facilities. The news is that operator training is strongly correlated with improvements in O&M planning as well. More dramatic yet are the significant effects of operator support and O&M planning on operator hours, scheduled maintenance, the stock of parts and supplies, and the condition of the facilities.

This comparative measure supported the earlier finding that hiring a utility manager or clerk increased collections. But it did not support the earlier findings about improvements in financial management, utility management, and utility policies and planning with the hiring of a utility manager. The difference in net improvements between communities with and without utility managers or clerks were not significant.

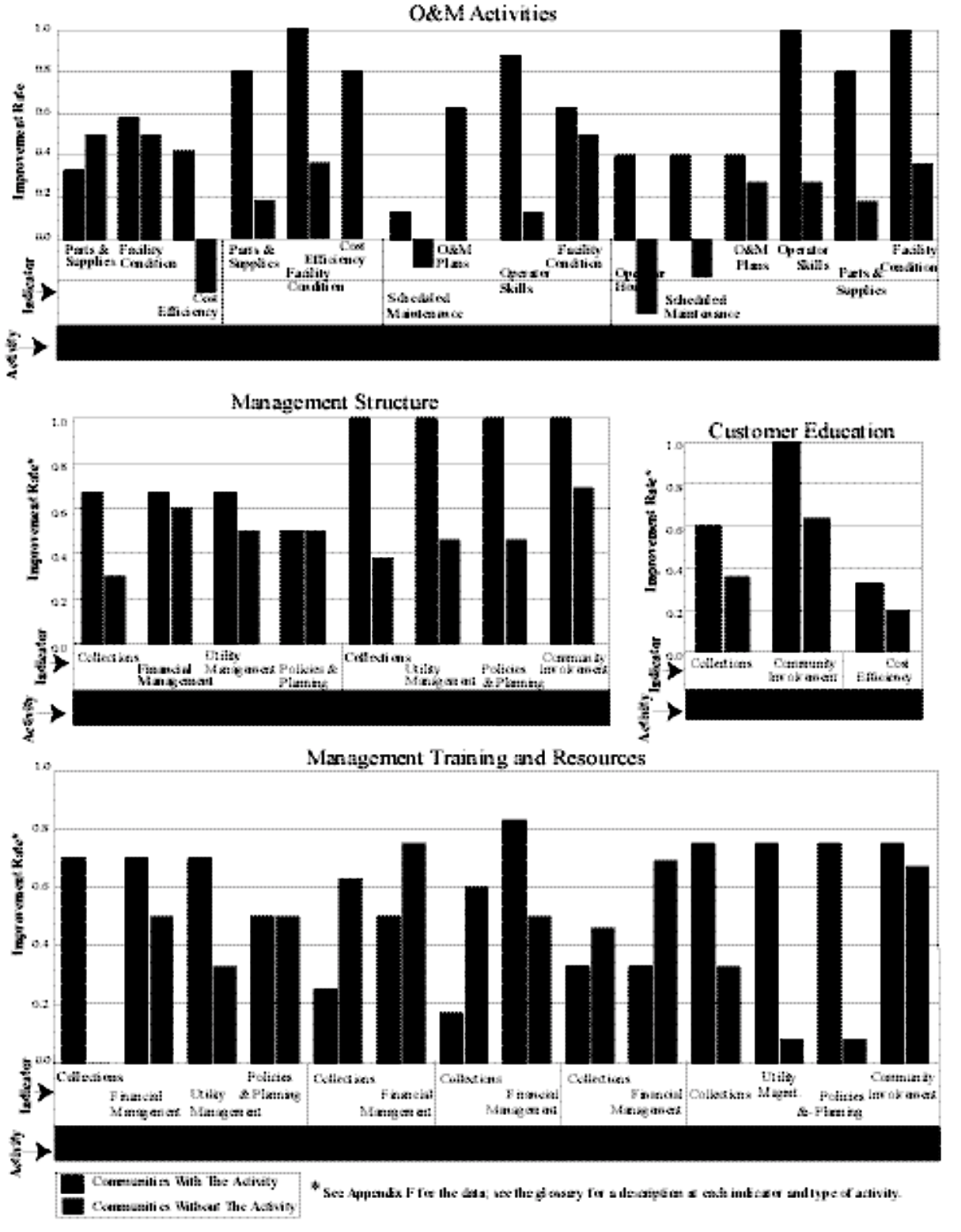
We did find that the positive effects of utility boards, committees, and city-tribe cooperation on utility management, ordinances, procedures and planning were robust. A new insight from this comparison was that communities with these activities also improved their collections much more often than communities that did not.

Utility management training has a very strong effect on collections and a positive effect on utility management. Communities with financial management or billing and collections activities or that aim to upgrade their office equipment actually fared worse in collections and financial management than communities without these activities. This perverse result is probably the result of selection bias: the communities that had more trouble with financial management and billings and collections to begin with were more likely to target these activities, and were less likely to succeed. Management planning and the development of ordinances and procedures had a positive effect on collections and on the institutional framework of policies and procedures but no significant effect on community involvement.

Table 10 summarizes the comparisons from the bar graphs and indicates whether the differences are significant. Unsurprisingly, communities that undertook O&M activities had better O&M outcomes than those that did not. The pattern is more mixed, however, for management activities: communities that undertook financial management or billing and collections activities, or that upgraded their office equipment, showed less improvement in collections and financial management than communities without these activities. This finding is also likely selection bias: communities with good financial management and computer systems were less likely to target these activities for the O&M project—and more likely to have other resources to make improvements.

But Figures 2 and 3 are quite limited in what they can tell us. A close reading of the narrative record in Volume II yields much more insight about what worked and why.

FIGURE 3. COMPARISON OF OUTCOMES, COMMUNITIES WITH AN WITHOUT THE ACTIVITIES



* See Appendix F for the data; see the glossary for a description of each indicator and type of activity.

* Improvement rate is calculated as the number of communities that show either improvements (not necessarily project related), less the number of communities that showed declines, divided by the number in the group.

TABLE 10. SUMMARY OF OUTCOME COMPARISONS WITH AND WITHOUT ACTIVITY

Activity	**Outcome Indicator**						
Operations and Maintenance	Operator Hours	Scheduled Maintenance	O&M Planning	Operator Skills	Parts and Supplies	Facility Condition	Cost Efficiency
Parts & Supplies					~	~	↑↑
Training (Operator)		↑	↑↑	↑↑		~	
Maintenance and Improvements		↑↑			↑↑	↑↑	↑↑
Operator Support, O&M Planning and Records	↑↑	↑↑	~	↑↑	↑↑	↑↑	
Financial and Utility Management		Collections	Financial Management	Utility Management	Ordinances, Policies and Procedures	Community Involvement	Cost Efficiency
Management Structure							
Utility Manager/Clerk		↑	~	~	~		
Boards, Committees or City/Tribe Cooperation		↑↑	↑	↑	↑	↑	
Utility Mgmt. Training		↑↑	~	↑	~		
Mgmt. Systems & Resources							
Financial Management		↓	↓				
Billings & Collections & Revenue Enhancement		↓	↑				
Office Equipment		~	↓				
Planning, Ordinances & Procedures		↑		↑↑	↑↑	~	
Customer Education							
Re: Utility Cost and Fees		↑				↑	
Re: User O&M						~	~

Legend:

↑↑ Much more improvement than communities without the activity

↑ Some improvement relative to communities without the activity

~ About the same or insufficient data to distinguish

↓ Less improvement than communities without the activity

Indicator not directly related to activity

(See Appendix F for supporting data; see the glossary for a description of each indicator and each activity.)

Partnership

Most of the work plans included a partnership activity, typically including the operator, clerk, manager, council; various outside agency staff such as the RMW, RUBA, LGS, VSW, or ANTHC engineers; and sometimes consultants. In most cases these relationships were already established and working in the community, but the project gave everyone a task to work on together and strengthened their communication and collaboration.

As the earlier discussion of leadership made clear, effective internal partnership is critical to improving O&M. In both project and non-project communities that the RUBAs and RMWs described as "good," community support and teamwork were there.

The importance of outside agency involvement varied across project communities. In some communities, active involvement of outside agencies was a critical factor in their success. For example, the RUBA in Shaktoolik, Tanacross, and Tanana; the RMW in Tanacross and Unalakleet; and the ANHB in Shishmaref, Tanana, Tanacross, and New Stuyahok. In other places, (including Galena, Napaskiak, and Noatak) community personnel were quite self-sufficient, only calling on outside agencies—if at all— for narrow purposes.

In yet other communities, no amount of help from the RUBA and RMW made a difference. In Stebbins, Venetie, and New Stuyahok this was because there was no community follow-through, and in Kiana and Koyukuk because the training and assistance the communities received was eroded by turnover.

Having ANHB as an impartial outside counselor helped some communities (including New Stuyahok and Shishmaref) sort out and think clearly about the issues. Non-judgmental support on whatever the community chose helped develop community capacity. While in the end New Stuyahok saw no tangible results, it was the coaching and encouragement of ANHB staff that inspired the city administrator to contact RUBA at all. The big difference between New Stuyahok and Venetie was community readiness to use the ANHB help.

The variation in the role of outside agencies resulted from several differences among communities, including a given community's existing level of administrative capacity; the nature of its project, particularly whether it focused on maintenance (RMW) or management (RUBA) issues; and the community's attitude toward outside agencies. It also depended on the quality of the relationships among the individuals. Relationships are central in village culture. Developing relationships takes time and requires a wider range of interaction and understanding than just getting the task at hand done. It is clear in the record that some agency staff people have more skill than others in cultivating good working relations with community personnel. The amount of time someone from an outside agency spends in the communities makes a difference: day trips are not as effective as overnight or multi-day trips.

Overall, it's clear that a conscious effort toward building partnerships does help improve utility O&M and management. While communities do not always want or need agency assistance, it is an instrumental resource for community leaders who are ready to make changes and welcome outside help. Improved communication and coordination between agencies serving a community also helps local leaders focus and coordinate their efforts.

Utility Management Structure

This was a major theme for Phase II projects, encompassing three types of activities: city-tribe cooperation; establishing a utility board; and hiring a utility manager or clerk.

City-tribe cooperation played a role in improving water and sewer management in four communities, though it was explicitly part of the work plan in only two.

In Tanana, the city and the tribal government operated separate water systems; establishing unified management was VSW's condition for planning and construction of a new system. Given the history of antagonism between the city and the tribe, this was a tall order. But since improved water and sewer systems were a priority for each, and they couldn't agree which one of them should manage the utility, they eventually agreed to set up a non-profit utility with equal representation from each. The ANHB grant supported the new organization during the transition, funding training for the new board as well as hiring and training a utility manager. The first annual meeting had a large turnout—about 100 people—and allowed for a useful information exchange among the board, consultant, contractor, and customers. It was such a success that it not only established the new organization as viable, but also reinforced the cooperative trend between the city and tribe. All the elements of commitment, leadership, broad support, and effective internal and external partnership were assembled in Tanana.

Napaskiak also divided utility management between the city and the tribe: the city operated solid waste and honey-bucket haul; the tribe operated the washeteria and watering points; and they jointly maintained the water plant. The community was in the process of shifting more governance responsibilities from the city to the tribe;[5] there apparently was internal agreement that responsibility for water and sewer should be consolidated too. The ANHB project was designed to facilitate this transition. The record supports a finding that the tribe is forward-thinking and growing in administrative capacity, and that it did improve management, operations and maintenance in the water and sewer utility.

In the past, the City of Chefornak had difficulty paying its taxes and managing its accounts. That was one reason the community decided to transfer responsibility for water and sewer from the city to the tribe. Responsibility for the ANHB project went with the transfer. Though it was not formally part of the work plan, the transfer was key to improving financial management of the utility. The tribe established a utility board and transferred the utility clerk position to report to it. The new board was instrumental in instituting new fees and gaining community understanding and support for them. Cooperation and support between the board, city, tribe, and outside agencies continues.

In Galena, the city and the tribe negotiated a memorandum of understanding creating the Galena Waste Management Steering Committee. Although solid waste management and the committee are outside the scope of the O&M pilot project, it does provide some support to ongoing efforts to improve water and sewer O&M in Galena.

In summary, city-tribe cooperation speaks to the larger issues of internal partnership, community support, and effective leadership that are essential to improving water and sewer management and O&M.

[5] Although it was not indicated in the record for this community, this may be part of the larger trend of declining state resources to assist cities and increasing federal resources to assist and empower tribes.

Utility Board. Every organization needs a governing body that sets policy—a locus for authority and accountability. When these functions rest with a city or tribal council, utility management and oversight is sometimes lost among the myriad of city or tribal governance responsibilities. Establishing an active utility board is a strategy for developing focus, commitment, and expertise in the governing body, as well as for broadening community support. The strategy clearly worked in Tanana. It worked in part because it had to: water and sewer improvements were a priority, and neither the city nor the tribe provided a viable alternative. As the governing body for an independent nonprofit utility, the Too'gha Board has full responsibility and authority. It also received extensive training and transitional support from outside agencies.

In Chefornak and Noatak, the utility boards were subsidiary to the tribal councils. The Chefornak board got off to a slow start and suffered from poor attendance, but picked up momentum after it began paying members $20 to attend board meetings. Board members came to understand the importance of paying for utilities and voted to increase fees for water and honey-bucket haul. In Noatak, payments to board members did not produce consistent attendance. The board was disbanded for lack of funds as well as lack of activity.

Utility Manager or Clerk. When the chief executive officer of the utility is also the tribal or city administrator—or the chief or mayor—again he or she has myriad responsibilities and limited time. Hiring a utility manager is a strategy for developing focus and expertise in utility administration and increasing the time and planning devoted to it. This proved to be highly effective, but too expensive for a small utility. Here again, Too'gha is the leading example. The utility manager hired under the ANHB grant developed a great deal of utility management expertise and his leadership was instrumental in developing effective administrative systems and good relations between the operators, board, customers, consultants and outside agencies. After the grant ran out, however, even with a 100 percent collection rate, utility revenues could not consistently support this position.

Similarly, Kiana used project funds to hire a utility manager who proved to be very effective at improving billing and collections, communications, oversight and planning for the utility. But when the grant ran out she was laid off.

Tanacross realized early on that it would not be able to support the utility manager position described in the work plan, and instead divided the responsibilities between the existing tribal administrator and the maintenance supervisor.

Mekoryuk used ANHB funds to pay part of the salary for a new city administrator whose duties included construction and project management, utility management, and customer education for the new flush-haul system. Initially he was very effective in these roles, but over time he became so busy with city affairs he could not complete all the utility management work.

There is no clear distinction between a utility clerk and a manager: there is a continuum of responsibilities that can be assumed under either job title. The utility clerk hired in Shaktoolik took on a broad range of responsibilities. She was instrumental in improving financial planning and management, record keeping, purchasing, billing and collections, and incentives for timely payment. She also supported a rate study that led to fee increases, customer education, and reporting to the council. The happy ending is that she increased collections from 40 to 90 percent—enough to pay for her position after the grant ran out.

While the utility clerk in Chefornak was not funded by the ANHB grant, she played a similar pivotal role in improving financial management there.

Koyukuk hired a "utility manager" whose primary responsibility was attending to the washeteria. While she did get some training from RUBA on using a computer to record data on washeteria operations, whatever capacity improvement this might represent was lost through turnover—twice in ten months. Venetie hired a utility manager, but there is no evidence in the record of any activity.

In sum, utilities that have the focused attention and expertise of a utility manager or clerk are way ahead of utilities that do not. In the focus group, the RUBAs and RMWs commented that a utility manager or clerk was key in communicating with the community leadership, coordinating training opportunities for the operators, and purchasing the spare parts. The unresolved problem is how to pay salaries for utility managers.

Revenue Enhancement

Here we include activities to improve billing and collections, raise rates, or develop other revenue sources. While only five communities specifically listed this as an activity in their work plans, fourteen communities attempted to increase revenues and eleven succeeded.

Shaktoolik is the top success story. Before the ANHB project, only about 40 percent of the customers were paying their bills. By the end of the project, the collection rate had increased to approximately 90 percent. At the request of the city council, the RUBA staff (with the assistance of the utility clerk and the water and sewer operator) developed a rate study for Shaktoolik. After listening to public comment, the city council increased rates for homeowners from $50 to $60 per month and commercial rates from $55 to $70 per month. The council also passed a new budget and a Code of Ordinances, which included utility ordinances.

Besides following the established utility shut-off policies, the rate study described several ways to improve collections. Those included offering discounts to customers who paid 12 months in advance; holding a raffle for customers who paid on time, with a prize of a free month of utility service; and taking delinquent customers to small claims court or taking away their Permanent Fund dividends.

The utility clerk initially attempted to encourage yearly pre-payment, offering a discount. However, most people did not have the necessary cash to pre-pay utility bills. With the approval of the city council, the utility clerk developed a monthly drawing. To enter the drawing, customers had to be current with utility payments (i.e., no outstanding money owed the water and sewer utility). The prize was one month's free utility. In the first month (June 1998), 19 people participated. By November, approximately 30 people participated. This led to a dramatic increase in utility revenues in a village with an estimated 46 homeowner accounts.

Nondalton had a three-pronged plan to increase collections: an improved billing system; customer education; and curb stops to discontinue service for nonpayment. The city hired a part-time staff person to install the new billing software and begin operations. It then sent residents a letter explaining the new billing system, the importance of making timely payments, and the penalties for non-payment.

Before the O&M project, Nondalton's collections for the utility were estimated at 30 percent. The city did not want to enforce payment with disconnects because it would be inequitable: one portion of the village had water service lines with shut-off valves, while others

did not have shut-off valves. During the initial installation of valves in the fall of 1997, collections increased as people anticipated the city's ability to shut off service for lack of payment. However, as it became obvious the city would not install all the shut-off valves that fall, collections went down again. Compounding the collection problem was the fishing disaster. The water and sewer collections from households decreased three years in a row, from $23,804 in FY97 to $14,506 in FY99. By the time of the closeout interview, however, the city had used the shut-off valves twice and collections improved immediately.

Billing and collections were a major focus in Kiana's work plan. The RUBA helped the utility manager set up a new computer and develop billing spreadsheets. The utility manager used these spreadsheets to send out utility bills and found they worked well. The RUBA reported that collections increased. The utility manager also proposed a raffle like the one in Shaktoolik for customers who paid on time; the city council did not adopt it. The utility manager was laid off when the grant ran out. If the current city administrator leaves, it is unclear whether the improved billings and collections can be sustained.

In Tanana, Too'gha improved management and fee collection at the laundromat. From FY 97 to FY 98, laundromat revenues increased from $40,362 to $55,001—a 36 percent increase, well in excess of RUBA's optimistic predictions. A major reason was that improved facility maintenance made it more serviceable and increased use.

A 1996 utility management assessment for Shishmaref found, in part, that washeteria rates were too low to cover costs; that there were problems with collections; and that some accounts were being billed improperly or not at all.

Though there is no evidence in the record that rates increased, Shishmaref did collect more revenue over the course of the project. Credit goes both to the sustained efforts of the city clerk and RUBA to improve billing, collections, and financial management overall and to the operator and the RMW working together to improve washeteria maintenance and service. The ANHB grant was instrumental in several ways, providing critical funds, third-party counseling, and a longer, two-year time frame for the project. (See the full discussion in Volume II.)

In Napaskiak, during the consolidation of operations and services, the tribe monitored its costs of operating the transferred facilities. From this experience it developed an estimated total cost for operating, maintaining and managing the water and sewer systems for one year. Once the tribe collected this information, it then determined a share—estimated at 40 percent—of community gaming revenue to be set aside for this purpose. By the end of the project, the tribe was fully supporting operation and maintenance of water and sewer utilities with gaming revenues.

Chefornak used ANHB grant funds to buy a computer for billing and collections. The billing and accounting system was not set up, however, until the new FTH system went in, sometime after the pilot project ended. The RUBA and a VSW engineer helped the utility manager set it up. The larger change during the project period was the transfer of water and sewer management from the city to the tribe. The tribe established a utility board, which voted to raise rates for water and honey-bucket haul. The record does not have information on whether the new rates cover the cost of service or on how much was actually collected. The tribe is willing to subsidize water and sewer costs with revenues from bingo and other sources.

In Noatak, collections increased primarily because the staff was willing to enforce the utility collections policy. Also, the community used the ANHB grant to purchase a new computer, decreasing the time needed to print utility bills and giving the utility manager more time to talk with customers.

In Tanacross, the tribe increased washeteria fees and collections. Even though collections did increase, they started from a very low base and will need to increase substantially more once the new sewer system is in operation. In the spring of 1999, the tribal council adopted a full set of ordinances, including water and sewer utility rates, user agreements, and provisions for terminating service.

In Kongiganak, the idea of a raffle for paid-up customers was a by-product of utility management training. This raffle and customer education carried out by the youth sanitation committee—through fundraising activities and a door-to-door survey—appear to have increased collections.

At the time it applied for the ANHB grant, New Stuyahok kept billing and collection records on paper and did not send out monthly water and sewer bills to its customers. Before the O&M project started, PHS provided the city with a computer and the support services of a consultant; training was never completed. In May 1998, RUBA staff visited the village to work with the city administrator to develop a computer method for sending out water and sewer bills; this training was never completed. At the end of the O&M project, the city was still not using the computer billing method.

On several occasions documented in the record, New Stuyahok's city administrator noted the need for an education effort to help customers understand why they needed to pay their water and sewer bills. At a community meeting, the administrator presented information on the costs of water testing and water treatment chemicals. After the project ended, the city ran CB radio announcements saying that the city offices were open and that people were encouraged to come in and pay. While the city administrator claimed some positive results from his efforts, the record is inconclusive on their long-term effects.

During the project period, the city administrator followed the customary practice of door-to-door visits to collect water and sewer utility payments. Since the door-to-door visits occurred about the time disaster relief funding and Permanent Fund dividend checks arrived, he was able to collect some of the outstanding water and sewer bills. Water and sewer revenues increased from $9,026 for FY98 to $19,942 for the first seven months in FY99. There is little evidence, however, that future collection rates will be any different from the historical pattern of 10 to 25 percent.

Washeteria revenues in Koyukuk improved—although very slightly and from a low base rate—due to efforts of RUBA and the utility manager hired with O&M project funds. The RUBA focus group and questionnaire note that Koyukuk had major setbacks when leaders left, but is now consolidating under new leadership:

> *. . . the [new] council is taking a hard line on utility collections, particularly electricity, largely because of working on the PCE reports with [RUBA]. The council recently voted to turn over $10,000 of delinquent electric accounts to an outside collection agency. Also, collection efforts within the city administration have been improved and standardized.*

Overall, what worked to increase revenues? Again, consistent, committed leadership was the key. Where this was present, these strategies worked to increase utility revenues:

- Computerized monthly billing and accounting
- Raffles to reward paid-up customers
- Credible enforcement of collections with shut-offs
- Rate studies and fee increases
- Public education and discussion of the need to pay for utilities and what the money is used for
- Improved washeteria maintenance and service
- Allocation of gaming revenues to help pay for utilities
- Grants to support utility manager or clerk positions
- RUBA coaching and training on financial management

Preparing for a New System

Another theme that ran through several Phase II projects was doing it right from the start: helping communities develop administrative systems in preparation for their new water and sewer facilities. The ANHB grant was seed money to get them started. Tanana is the foremost example. Grant funding supported the utility manager and subsidized the operators during the transition from city and tribal operations to the nonprofit Too'gha and the preparation for the new piped system. During this period local leaders developed ordinances, an accounting system, personnel policies, and, with VSW funding, a business plan. Unfortunately, construction of the piped system will not be completed for several years, so service and therefore collections have not started. Although the new laundromat is generating a revenue surplus, it is not enough to cover the operations of Too'gha.

Like Too'gha's work plan, Tanacross's plan called for hiring a utility manager who would develop systems and management skills to serve the new sewer system long after the O&M grant ended. When construction was delayed, the community decided not to hire new personnel, but continued with the planned activities—although at a slower pace. It focused on educating customers on the new system and the need for paying user fees; on drafting ordinances; and on training operators and managers. The tribal administrator and vice president got OIT-certified to help the village score higher for planning and construction grants.

Tanacross's water and sewer ordinances are a good model. The tribal administrator coordinated with the LGS, the RUBA, and a consulting firm to ensure that the draft ordinances contained the necessary sections for utility management. During the drafting of the ordinances there were several village meetings, usually attended by five to seven people. The tribal council adopted temporary ordinances as they were developed and the full set of ordinances in the spring of 1999.

The Tanacross O&M project improved the existing utility system while the community prepared for a new system. The boiler replacement will reduce maintenance costs for several years. The parts inventory should reduce the time staff spend identifying parts when ordering

replacements. The water and sewer ordinances provide users a foundation for understanding their rights and responsibilities with the new sewer system. Because the sewer project has been built with local labor, the village increased the number of locals who know the system. The construction crew may be a source of personnel for the utility in the future.

Napaskiak took a different approach. Instead of focusing on management for a major new system, it focused on incremental improvements to existing operations. Specifically, the community invested its ANHB grant in a sewage pumper vehicle that will serve the immediate purpose of pumping and transporting sewage from honey-bucket collection bins. When the city gets flush-haul units, the pumper will be used to service them. The tribal council monitored operating costs for the water and sewer systems and successfully budgeted gaming revenues to pay for them. It also invested in operator training and developed a regular maintenance schedule. The administrator communicated in person and by letter with customers, instructing them to avoid putting debris that could damage the equipment into the haul bins.

Shishmaref is an example where the city, contractors, agencies, and ANHB collaborated from the beginning to help the village prepare for a new flush haul system. ANHB played an important role by providing the city with funds to maintain staff while it worked to improve maintenance and collections in the existing system. Activities included setting up separate accounts for the utility; monitoring costs and revenues; reviewing rates; maintaining the water plant and washeteria and ordering parts; training and supporting operators; and educating the community on use of the facilities. The city made large strides in improving O&M and financial management, but it was plagued by problems with the flush-haul system.

Mekoryuk already had a flush-haul system underway and needed to develop administrative and financial capacity to manage it. It used the ANHB grant to buy time for the city administrator to work on construction project management and utility management; to buy office equipment; to train the administrator, clerk, and operators; and to educate customers. While these efforts succeeded in the short run, even with a high collection rate the revenues were all consumed by O&M, with none left to sustain the administrator after the grant ran out.

Chefornak planned to use its ANHB grant to develop computerized billing and accounting for its new flush-haul system. When construction was delayed, completing the billing and accounting system and putting it into operation were also deferred to 1999.

Kongiganak planned to use its ANHB grant for community education, a user manual, and operator and management training for the new piped water and sewer system. When construction was delayed, the user manual and community education activities focused on the honey-bucket haul utility instead.

The work plan for Kiana included a new computer, billing and collections system, and customer education—apparently intended to prepare the community for a flush-haul system. In practice, the plan was implemented for the washeteria operations; construction of the flush-haul system was not begun until 1999.

In sum, the project communities had limited success with the strategy of preparing to manage new systems,because either: (1) construction delays put the O&M project out of sync with the new water and sewer system, so project activities were less meaningful and grant funds not well used; or (2) the O&M and management requirements for the new systems proved too expensive for the communities to sustain from utility revenues.

Maintenance on Old Systems

Nondalton's water system, built in 1971, is one of the oldest in rural Alaska. Before the O&M project began the water plant treated approximately 72,000 gallons per day. Based on village population and the per capita national average water consumption, a city this size should have been pumping between 25,000 and 30,000 gallons per day. The city believed its excess consumption was mainly due to leaks in the system and wasteful use by customers. Using the ANHB grant, the city replaced 20 old copper service lines and conducted customer education. Water use dropped 30 percent, down to 51,000 gallons per day. Over several years, this reduction will translate into reduced O&M costs through reduced demand for treatment chemicals, less wear and tear on pumps, and longer use of current storage capacity before the city needs to expand the system to accommodate population growth. Installation of curb stops also gave the city the ability to enforce shut-off for nonpayment.

Unalakleet also has an old water system with high O&M costs. Even with utility maintenance as a priority, the city has had difficulty generating revenue to pay for more than the basic operational costs. The O&M project provided funds for needed maintenance, including repairs to standby power generators and sewer lift-station pumps. The city also bought spare pumps and motors for the water plant or lift stations. The critical spare parts and operational back-up generator are expected to save money in future repairs.

Unalakleet and Galena both have problems with non-standardized parts. In Unalakleet, the lift stations all have different pumps because they were built in different phases. This increases operating costs: it is too difficult and expensive to keep four different types of pumps in inventory, especially when some of the models are no longer available. The RMW report recommends standardization. Turnover in PHS engineers has also contributed to the problem.

In Shaktoolik, the operator and laborers reconditioned five leach pits and re-insulated two septic tanks and leach pits. This maintenance will increase the life of the leach fields.

Galena is pursuing another strategy to improve efficiency: new alternative technology septic systems that permit on-site disposal in semi-permafrost soils.

In Noatak, a pump and control panel at the lift station went out. A replacement pump was not available, and it took three months to get the pump sent out, rebuilt, returned and reinstalled. Meanwhile the city had to hire extra labor and the pumper vehicle to move the sewage from the inoperable lift station to the operating lift station. All in all, the community incurred about $17,000 in unplanned expenses. It had to cut the budget and reduce operator hours, thereby performing less O&M. Also, a construction project ruptured the waste heat line, so Noatak has had to pay for heat rather than use waste heat. The O&M project partly paid for this emergency repair work. Without the O&M project, the utility would have been worse off.

Kiana has a 1971 vintage water system. The lines freeze easily and the maintenance costs are high. The city has historically fixed water and sewer line freeze-ups that by ordinance are the homeowners' responsibility. Because the system is old, this maintenance requires a substantial amount of the operator's time and drains the city water and sewer budget. The current city administrator is starting to enforce the city ordinances, though it is too early to tell if the city council and the customers are willing to change the historic pattern.

In sum, there may be significant opportunities to improve the cost efficiency of old systems through system maintenance and repairs. Also, enforcing homeowner responsibilities can lead customers to take better care of their plumbing and service lines, as well as shift some of the expense off the utility.

Customer Education and Community Involvement

Customer education is intended to encourage proper use and maintenance of the facilities— thereby lowering O&M costs—and timely bill payment.

There is also a broader concept of community involvement that aims to increase two-way communication about water and sewer utilities. This kind of involvement is intended to elicit community feedback for improving service, satisfaction, and facility design; to enlarge the community of knowledgeable and engaged people for utility oversight and governance; to expand the skilled labor pool for operators, alternates, or assistants; and generally to promote a sense of "ownership." For example, Tanacross's use of local labor in construction was intended to increase local knowledge about the new facility and about operating and maintaining it. Too'gha's board, open planning meetings, and well-organized annual meetings engaged community members in utility oversight and governance. Kongiganak's customer survey elicited opinions about current water and honey-bucket services and informed the community about plans for and implications of a new piped system.

Education About Utility Costs and Fees

In planning for the new sewer system in Tanacross, the tribal administrator and agency staff recognized the need to educate customers about the new system and the need for paying user fees. The tribal council organized a public meeting to present information on user fees, user agreements and contracts, and the additional costs of the new system. Council members described the enforcement of fees and acknowledged the burden that it may cause for some people. The 12 to 15 residents who attended generally agreed that it was good to set up user fees. Because of construction delays, we have no evidence in the record whether these efforts at community education paid off in higher collection rates.

New Stuyahok focused on improving collections through customer education, customer billing, and personal requests for payments of overdue bills. The work plan called for a letter or handout informing water and sewer customers about the importance of maintaining the water and sewer facilities; reporting the costs of maintenance and of fluoride and chlorine; and discussing why the water samples must comply with government regulations. Documented activities consisted of one community meeting; CB radio announcements that the city offices were open and encouraging people to come in and pay their water and sewer bills; and the city administrator going door to door collecting water bills. During his talks with community members, he noticed the need to develop a flier or information sheet describing the utility costs to help them understand why they need to pay for water. He also expected some backlash when the customers received monthly bills for the new water and sewer system. The city administrator reported that a small percentage of people have begun to recognize that the water and sewer utility is theirs and they need to take care of it.

Kongiganak has also been preparing for a new piped system. Its work plan called on the traditional council to provide information to community members and utility users—through monthly meetings, radio announcements, house-to-house visits, and fliers—about costs

associated with operating and maintaining the new utility. Because construction was delayed, however, the youth sanitation committee developed information on the honey-bucket haul utility instead. It developed a user's manual outlining procedures and guidelines for using the facilities. The brevity of the manual made it easy to distribute, post, and remember.

The O&M grant project advisor and two committee members also conducted a household survey, during which they explained the plan to upgrade to household flush toilets and answered residents' questions about the current system. This helped residents understand what was going on and their role in making the system successful in the future.

The youth sanitation committee also briefed the traditional council and organized fundraisers (to pay its own expenses), which helped raise awareness about utility operations.

These communities have subsistence economies. Most residents have limited cash income and little or no experience paying for local services. Collections and customer attitudes toward utility fees are the biggest challenges rural utilities face. While the record shows few short-term effects of education efforts on collections, there is some evidence of changing awareness and attitudes that may have long-term benefits. More opportunities for community leaders to get together in their regions or statewide to share their experiences and discuss what kinds of strategies have worked would be helpful.

Education to help Reduce Operation and Maintenance Costs

Noatak is the best example of customer education to reduce maintenance costs. The utility manager and the operator developed a laminated one-page flier reminding homeowners about what not to flush down the toilet and what to do to ensure pipes didn't freeze. The flier also pointed out that it is the homeowner's responsibility to fix all leaks inside the house and listed whom to call if they needed help. After distributing the flier, the operators noticed they got fewer calls for assistance and had fewer problems with the lift station. The utility manager found customers were more cooperative. The utility manager and operator discovered the flier made their jobs easier.

Nondalton wanted to reduce water consumption. The community prepared and sent fliers to customers explaining how they could reduce water use. The fliers described how to fix leaking faucets, the importance of turning off faucets when not in use, and the amount of water wasted by continuously running toilets. A city staff person went door-to-door explaining to customers the effects of letting the water run continuously. The city hosted a small community demonstration on how to save water by re-setting toilet tanks to lower levels, using low-flow shower nozzles, and taking other steps to reduce water use. The city also provided sessions at the school to teach kids the cumulative effects of leaving water on unnecessarily.

A key benefit of the education program was getting residents to tell the utility when they were going to be out of town for more than a few days. Once the shut-off valves were installed, the utility could turn off water in individual homes, reducing the risk of frozen lines if the heat went out. Homeowners benefited because they were not billed for water during such periods. Since starting this policy, the city has had fewer freeze-ups.

Another incentive for homeowners to notify the utility when they are out of town is the city policy that households must pay for repairs to their service lines. The city also beefed up collections with a letter explaining its new billing system, the importance of making timely payments, and the penalties for non-payment. Project outcomes include an estimated 30

percent reduction in water consumption, because leaking water service lines were repaired and customers conserved more water.

Napaskiak's tribal administrator noticed plastic bags and other debris in the honey-bucket bins—debris that could damage the new pumper equipment. He sent letters to the households that used these bins, asking them not to dispose of debris in the bins. Other times he called the householders directly, explaining the problems operators had with debris in the bins. The resulting change in household behavior lowered O&M costs for honey-bucket haul.

Shaktoolik's utility clerk and operator walked door-to-door to talk with customers about the importance of heat tapes and keeping their house temperatures level. This effort helped customers learn what they could do to reduce maintenance problems and utility costs.

In Shishmaref, one of the main tasks for the O&M project was preparing the city administration and customers for the new flush-haul units. One goal was to make customers more familiar with the new equipment in their homes and reduce the potential for maintenance problems during the winter. The contractor who built the flush-haul system was reported to have provided posters, placards, and pamphlets for the houses. Ongoing problems with the units indicate that either the education efforts were unsuccessful, or that the problems customers had with the system were beyond their capacity to deal with. In either case, maintenance costs remain very high.

Mekoryuk's VSW engineer provided training for homeowners, administrators, and operators on the construction and maintenance of the flush-tank haul system. He also covered environmental impacts, health concerns, and potential solutions. The city administrator reported being stopped on the street by residents asking who was responsible for maintaining the flush-tank haul system. There were public meetings to discuss costs and responsibilities for the system and to allow customers to describe their concerns about the project. Information was also distributed through cable TV.

Koyukuk posted notices and signs on proper use of the washeteria. Utility use was discussed during city council meetings.

In these communities, most residents have limited experience with household plumbing. Many people don't know what can and can't be put down the toilet, the best ways to prevent freeze-ups, or how to make simple repairs to their units. Basic information provided in an easy to understand format—particularly information about the new technology now being installed—goes a long way toward creating a smoother running, lower-cost system.

While the significance of the community education efforts varied widely across these projects, there is no question that community education is a critical element in the effort to lower maintenance costs and increase revenues for village water and sewer utilities.

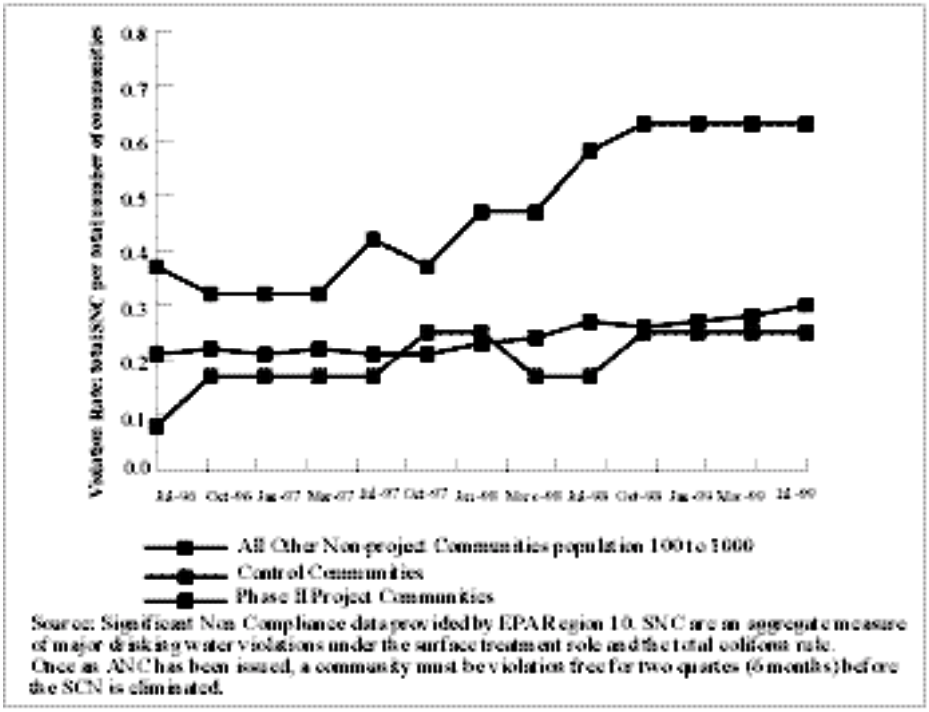
Chapter V. Was the Pilot Program Effective?

Did the ANHB project make any significant difference in O&M performance in the project communities, compared with other communities? We are looking at several statewide data sources, but have completed our analysis of only one—major drinking water violations (SNCs, or significant non-compliance) reported by the U.S. Environmental Protection Agency. For this report, SNCs are used as an index of O&M performance.

Figure 4 compares major drinking water violations across project and non-project communities before, during, and after the project period. The control communities are 12 that applied for but did not receive ANHB demonstration grants. The super control communities are all other Alaskan communities with populations between 100 and 1,000. SNCs are an aggregate measure of major drinking water violations under the surface water treatment rule and the total coliform rule. Once an SNC has been issued, a community must be free of violations for two quarters before the SNC will be removed.

The figure shows that SNCs have been rising among both the project and the control groups.[6] SNCs for the project communities started out at a much faster rate and rose faster than for the control group.[7]

FIGURE 4. SNC INDEX OF O&M PERFORMANCE FOR PROJECT AND CONTROL COMMUNITIES



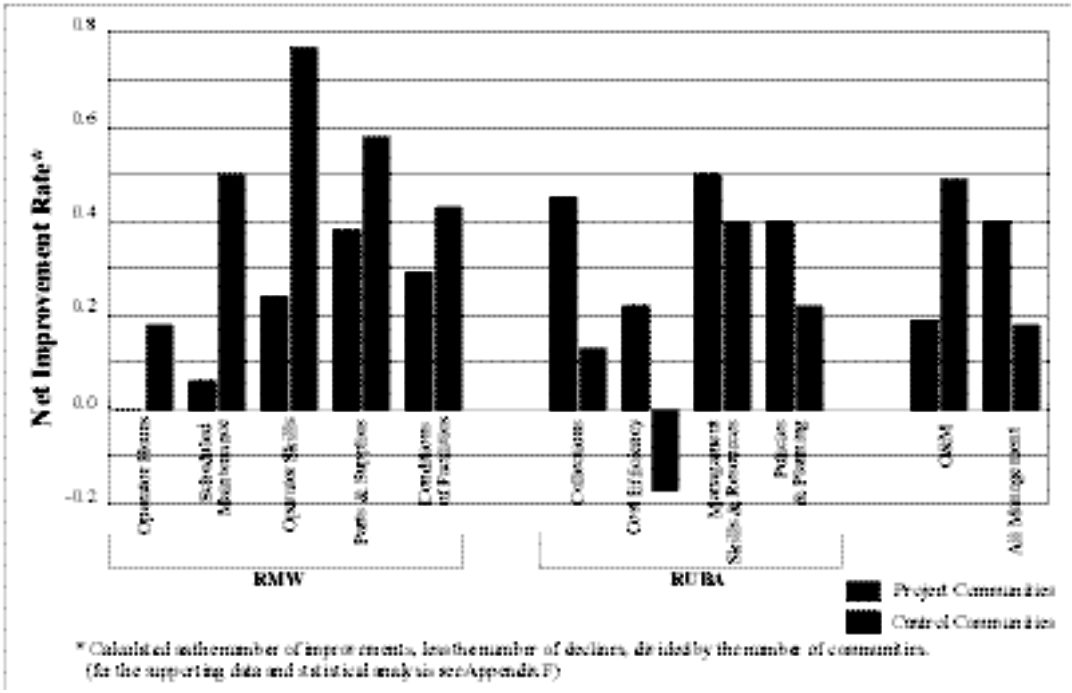
Source: Significant Non Compliance data provided by EPA Region 10. SNC are an aggregate measure of major drinking water violations under the surface treatment rule and the total coliform rule. Once an SNC has been issued, a community must be violation free for two quarters (6 months) before the SCN is eliminated.

[6] Neither EPA nor DEC has been able to explain this rising trend.

[7] It is possible that the project communities have a higher rate because a larger proportion uses surface water and they are therefore subject to the surface water treatment rule.

Figure 5 compares the results of the RUBA and RMW questionnaires for project and control communities. (The control communities is this case were other communities the RMWs or RUBAs worked with, selected for their similarities to the project communities in populations and utility technologies.) The bars represent the changes in indicators averaged across communities. The Phase II project community data derives from Table 9.

FIGURE 5. CHANGES IN INDICATORS REPORTED BY RMWS AND RUBAS, PROJECT AND CONTROL COMMUNITIES



While Phase II project communities on average consistently did worse than control communities in improving O&M indicators, and consistently did better in improving financial management indicators,[8] none of the differences are statistically significant. (See Appendix F.)

The most robust difference appears to be the percentage of maintenance activities completed, for which a smaller proportion of project communities had increases and a larger proportion had decreases than among control communities. In responding to questions about maintenance activities, RMWs saw an increase more often among control communities as compared with project communities. In the project communities, RMWs noted a decrease in scheduled maintenance among project communities compared to control. One reason for this may have been that project communities were more likely to work on upgrading facilities (i.e., adding shut-off values) or handling larger emergency problems (i.e., the rebuilding of a pump) and hence scheduled maintenance decreased. Control communities continued with and increased their maintenance activities. Similar proportions of control and project communities kept about the same level of scheduled maintenance activities.

Observations about the Program

The RUBA discussion in the focus group was more eloquent than the data. The innovation of the ANHB program as a whole is best summarized by Mike Black:

> *What this project did was lay out some money that didn't have to build a building, you don't have to go start a new community hall, you can use this for operations and you can use it for management and we'd like to see long-term result from it. I think that is very different than what kind of money they're [the communities] seeing now . . . . This said we want it focused on utility management, utility issues, operating and management, but you have a lot of leeway as to how you want to propose to spend it.*
>
> *ANHB was focusing on the hard-to-serve communities. . . . The benefit of ANHB grants . . . was that it would help focus the councils and the mayors and the leaderships in general vision or purpose on utility issues, because it was there. In other words, if somebody told the council there was $20,000 there that could deal with this issue, which is utility management related or utility related, they were a hell of a lot quicker to grab a hold and spend that time to get focused on that issue, than they would have been by us going in solely and saying you need to deal with utility management.*
>
> *It's very difficult to predict where you have proper so-called management, and who's going to be successful. In hindsight, it's very easy to see what went into it, but when you're looking into the community for the first time that's [hard. ANHB's approach was] very general work plans, leaving most of the initiative up to the communities. In the communities that were successful, I think that was a positive approach because it cut down on the restrictions in the sense that the bureaucracy and paperwork necessary to get the grant and use the grant were reduced. So it probably had … a more positive impact in those communities than the more restrictive grant conditions that are more typical.*

[8] There is potential here for observer bias. The Phase II projects focuses on management activities. The RUBAs were more likely and the RMWs less likely to be familiar with and sympathetic to the project..

Another RUBA, Irene Catalone, echoed some of those perceptions.

> *The key there was flexibility . . . . They were willing to work with the communities. Another innovation that occurred was the emphasis on partnership. The most successful projects and those that are expected to have long-term effects are communities with strong partnership teams. To me, the biggest thing that contributed most to whatever small successes may have led to larger successes, was the different agencies working together. Where we had the greatest success, [we] would be working closest together.*

The RUBAs also had some suggestions about how to improve the grant program:

- When evaluating the applications, assess the level of community involvement and support. Consider who actually wrote the grant: was it a community person, consultant, or agency representative? Does the application reflect community priorities? Are community leaders committed?
- Assess community cooperation and partnerships; require partnership in the project work plan and implementation such that they have to play an active role and meet certain criteria.
- Review and comment on persons hired to work on the grant to ensure the best-qualified person is hired. Reduce the influence of family relationships.
- Encourage involvement of the school; build an awareness of what city government is and what utility management is, and build a bridge from schools to job opportunities in city office, tribal office or corporation office. If young people want to stay in the communities, there are opportunities, because communities need qualified personnel to run these systems.

Like the RUBAs, the RMWs thought that the ANHB grant program was valuable, but had reservations about the lack of conditions on the grants. Their suggestions for tightening up the program included:

- Increase RMW input in the application and selection process for ANHB projects.
- Set prerequisites, such as that somebody in the community has taken the utility management class and is involved with managing the ANHB project in the community.
- Require a preventive maintenance plan to be submitted before the first grant payment.
- Require the city administrator or tribal administrator and financial person to attend utility management training as part of the grant award.
- Require that anyone who attends training paid for by ANHB grant funds return to the community and apply that training.

ISER Observations

We raise the issue of ANHB oversight. While the philosophy of the program is to empower communities, there also needs to be an element of accountability, oversight, and feedback for effective learning. Grantees must be accountable to ANHB not only for funds spent but also for the underlying purposes of the grant. ANHB needs to provide continuing oversight and feedback to help grantees (if they need such help) to stay focused on their project

goals and to re-assess those goals and adapt project activities in the light of new experiences and changing circumstances.

While on the whole the projects and ANHB's oversight relationships with the communities were successful, it is worth reviewing experiences in a few of the less successful communities to see what we can learn to make future programs even more effective.

New Stuyahok used its grant to pay the water and sewer operator and the clerk. While there was some progress toward computerizing customer accounts (using that account data for reference), the community did not achieve its number one goal of sending out monthly water and sewer bills. This community is having a hard time making the transition from external funding for local services—supplemented by periodic personal appeals to pay water and sewer fees—to internal funding based on monthly paper billings and systematic collections[9]. While the ANHB project was intended to help the community make this transition, its net effect was to enable it to continue in the old mode a year longer and to *reduce* the monthly water and sewer fee from $25 to $15 per month, using the fishing disaster as a rationale.

The first quarter report was submitted on time and reported reasonable progress on all the work plan activities. ANHB's second staff visit occurred April 1, 1998. The second quarter report, completed May 1, 1998, is the first evidence in the record that the billing system was falling behind schedule. For the third quarter, August 11, 1998, New Stuyahok reported it was still working on all the tasks, but there was no apparent progress. ANHB sent the last $10,000 of the grant on August 28, 1998. This final check could have been withheld pending substantial completion of the work plan—specifically, the task of monthly billings.

Koyukuk had a great deal of turnover and turmoil. The city administrator's position turned over three times, and the utility manager position turned over twice. A previous city administrator who was no longer in the village had written the application and work plan. The budget was spread across operator wages, manager wages, training, office equipment, and parts and supplies. The first quarter report showed very little activity, yet claimed $10,000 in documented expenses. The second quarter report showed good progress. The third quarter report was blank, but claimed $13,000 had been charged against the grant. Among all the villages, Koyukuk's phone logs indicate the least amount of work carried out. Apparently, ANHB continued sending checks because the community submitted good financial documentation. We also note in the record an improving trend in community leadership, albeit not on work plan tasks. The RUBA focus group noted:

> *Koyukuk has gotten off to a slow start since many of the community leaders left their positions in the past year to take jobs outside the community. The city now has an active city council and strong mayoral voice . . . . the city council, ANTHC [and] RUBA [are actively working together] regarding the coming flush haul pilot project. [Regarding utility fee collection:] At the present time Koyukuk has no water/sewer distribution except for the school, which they are keeping current. Laundromat revenues have increased marginally. However, the council is taking a hard line on utility collections, particularly electricity, largely because of working on the PCE reports with [RUBA]. The council recently voted to turn over $10,000 worth of delinquent electric accounts to an outside collection agency. Also, collection efforts*

[9] Practical finances may become a problem, but that is not the threshold issue at this point.

> *within the city administration have been improved and standardized. [They] recently weathered a cash flow crunch in the laundromat, largely because of some unchecked purchasing and payroll tax obligations. The purchasing is now back on track and the council and administration are now monitoring all expenditures. The problem in Koyukuk was that for a while the city attempted to run the laundromat as an autonomous operation, all payroll and purchasing is now back under the purview of the city. [RUBA has helped in improving management skills, systems and resources by . . . assisting] with the PCE reports and accounting. The city has a ways to go but the trend is definitely improving. [Regarding utility policies, planning and procedures:] strong improvement in this area. Koyukuk has had problems with the flush haul system from day one, largely as a result of community apathy. Now, the community leaders are determined to go forward on the project and as a result a great deal of planning is taking place. Examples: Working on an ordinance for the sanitary landfill, completing house-to-house surveys for flush haul, planning on lands disposal and clear title for the flush haul project.* (RUBA focus group and questionnaire)

Kongiganak's plan was an undisguised jobs project. The first activity was a youth sanitation council, for which members were paid a stipend. The application justified this, saying "This would create more jobs for our community, thus keeping in step with welfare reform." The largest item in the budget was operator salary, 28 hours per week for a full year. The grant also paid a part-time project advisor. The work plan included several activities emphasizing preparation for the planned piped water and vacuum sewer system. The first quarterly report noted that since the piped system had been delayed, some activities would require a project extension. Had ANHB been tracking closely, it might have suggested renegotiating the work plan, holding some of the funds over for another year. The first quarter, Kongiganak received $10,000 and reported spending $3,000. During second and third quarters it received $10,000 and spent $8,500 and $8,708 respectively. It is not clear in our (ISER) record when and how the remaining grant funds were accounted for. There is also no evidence that the parts inventory task was ever completed.

As it happened, ANHB could not keep up with all the Phase II communities. Flexibility, adaptation, and relationships are ANHB's hallmark with the pilot program; these elements can be lost with large workloads. The staff can only work with and keep track of so many villages.

Overall Interviews

The richest sources of information about the effects of the ANHB program overall are interviews with the communities themselves. By the deadline for this report, we had completed overall evaluation interviews with administrators in ten of the Phase II project communities. Without exception, each of the ten communities felt that the Alaska Native Health Board grants helped their communities make significant long-term improvements in sanitation operations and maintenance. Furthermore, most felt that they would not have made the improvements without assistance from ANHB. But even the communities that thought they might have made the improvements anyway felt that ANHB's financial help and other support helped their projects move along a lot faster and more smoothly. The mayor of Nondalton summed up the feeling of several when he stated, "We were aware of the problems before the

grant, but we might not have had the money to do it as quickly. It was definitely a shot in the arm, and reduced some of our costs to free up more money for O&M."

When we asked "How did the Alaska Native Health Board grant program help you?" community responses tended to cluster around three main areas: money, staff support, and technical assistance.

> I think every community should do a program such as this because it makes them start thinking about what they really need, and what they need to do in the future, what they need to do in the immediate, in the present.
>
> Tom Greene, Mayor, City of Nondalton
> *ANHB Closeout interview, July 13, 1999*

> That $35,000 (the O&M Grant) has probably done more for this community, the people, and the awareness of the importance of water and sewer. The fact that (the grant is) helping us into a scenario to where we can actually, physically maybe be responsible for our system, whereas we couldn't in the past.
>
> Tom Greene, Mayor, City of Nondalton
> *ANHB Closeout interview, July 13, 1999*

Money

Overall, administrators we interviewed saw financial support for community projects as the most critical component of the program—mainly because most of the villages are small and unable to generate enough money for large-scale community projects. In fact, all the administrators interviewed said funding from any source was vitally important.

Several communities used some of the project funding to purchase computers to help utility managers or administrators modernize and update their water and sanitation operations, organize material, keep track of parts, supplies, and labor costs, and make contacts with people outside their communities. Several communities are now keeping utility payment records on computers and will even disconnect customers who are delinquent or will require pre-payment for those who are behind on their flush and haul payments.

A few communities were able to obtain computers or re-locate old computers for operators—to make their O&M, inventory, purchasing, and record-keeping tasks quicker, easier, and more systematic. In some instances, they used ANHB funds to secure training for those who would be using computers for the first time. In contrast, a few village operators have progressed to a level where they have created customized computer programs that they can monitor daily for routine and preventive maintenance. However, such computer expertise is still a long way from being the norm.

Other villages used ANHB funds to purchase much needed equipment like vacuum units that help prevent raw sewage spillage in the summer, or to replace or upgrade worn out equipment, pipes, copper lines, boilers, tools, and washing machines.

Staff Support

The second most valuable component of the program was ANHB staff support for the project communities. Community leaders acknowledged Joe Sarcone, Nina Miller, William Ashton, and Tina Long at various times throughout the survey for being strongly supportive. They listened to people in the communities, helped them think through the problems they were experiencing, and helped them make plans to correct those problems.

Administrators were grateful that the ANHB staff worked to tailor programs to the particular needs of their communities. Indeed, a frequent praise of the ANHB staff was that

each of them had, at one time or another, come directly to the villages to try to understand the conditions and circumstances that existed there. Another characteristic of the ANHB staff that pleased administrators was that they encouraged the villages to determine their own courses. They listened, visited the villages, offered suggestions about options and possibilities that might be considered, and were available for ongoing consultation and support. Local leaders were then free to consider all options and discuss them with the community at large.

The ANHB staff was also praised for the quality of its ongoing community support. Most of this support was through frequent telephone contact, but in several cases local leaders noted that when necessary ANHB staff "came out to the village personally, rather than just talking on the phone." In one instance, the city manager of Galena reported that Joe Sarcone even accompanied him when he presented to DEC his case for installing 30 new septic tanks.

Technical Assistance

The ANHB staffers also helped in other ways. They helped communities make operations and maintenance a priority by funding community door-to-door surveys and projects to educate the community about issues like water use and the proper care of home sanitation systems. They also helped communities develop comprehensive plans and establish community ordinances to support water and sewer regulations. The ANHB staff also helped solve ongoing computer technical problems, as well as helping village workers learn how to use new computers and develop technical skills.

In many instances, they helped community leaders write grants to obtain money from other funding sources. They encouraged villages to link up with other agencies that could help them reach their goals. Those included agencies like RUBA, which went into villages to help establish accounting and bookkeeping systems that enabled communities to better monitor and manage their sanitation funds.

"Couldn't be better."

When asked a question about "ways the ANHB program could have been better," community administrators had no suggestions. All of the respondents said that ANHB had always been ready and willing to help and had always lived up to its agreements. All were pleased with ANHB performance throughout the contracts and did not believe there was anything that could have been done better. The tribal administrator in Napaskiak captured the general tone of community responses when he stated, "They were real good with our grant. They were real good. I just have one thing to say and that is, 'Keep up the good work.' Our contact, Joe Sarcone, was real good. He came to the village two times and was very helpful. ANHB opened up areas that were not available before, and helped us establish contacts throughout the state, and told us of new funding opportunities. There is nothing they could have done better."

Even though respondents had no suggestions for improvements ANHB could make, many used this question to make a plea for ongoing funding. These administrators expressed a strong desire to continue to improve the quality of the water and sanitation in their villages. Requests for funding here covered a wide range of possibilities, including needed equipment, computer programs and training, continued operator training for certification, operations support, and just "funding" in general.

All of the villages surveyed reported they were either "satisfied" or "very satisfied" with the Alaska Native Health Board program in their communities. The combination of ANHB funding tailored to the needs of each community and staff support that was personal, caring, and educational rather than directive appears to have created programs that were both immensely satisfying and productive in the view of all the community leaders.

Other Agencies

When administrators were asked what other programs were valuable to them in improving their water and sanitation operations and maintenance performance, it was evident that there are many agencies working to improve and maintain water and sewer systems in rural Alaska. Most frequently mentioned by the communities surveyed thus far in the project were the Remote Maintenance Workers (RMWs); Village Safe Water (VSW); and Rural Utility Business Advisors (RUBAs). Other agencies mentioned were the U.S. Public Health Service (PHS), - the Alaska Department of Community and Economic Development (DCED), Federal Rural Development, and Cowater Construction out of Ontario, Canada and Anchorage, Alaska.

In the final survey question of the overall evaluation interviews, administrators were asked how regional, state, or federal agencies could improve service to their respective communities. Two responses were mentioned repeatedly and with equal frequency and were directed to all levels of government. Those two responses were:

- Improve agency communication with the villages. This would apply to both disseminating information and asking more questions instead of just giving directives. Local leaders also considered it very important that agency personnel travel periodically to villages to see and understand what is happening there.
- Improve funding sources for all rural community water and sewer projects.

A third frequent response, also closely related to the request for increased funding, was that the government simplify the grant application process to make it easier for communities to apply to a variety of potential funding sources. Other suggestions for improved service to villages included striving for coordination in processing applications and coming to the villages to do yearly inspections.

> I think the ultimate and the most important thing for all agencies is that they need to 'Ask' not 'Tell.' Let us (the village staff) be part of solving the problem instead of feeling that we are a sore and they need to put a bandage on it. I could expand on that question till tomorrow morning, but it boils down to getting them to ask us questions. Because we are not all engineers out here, they rely on their experts and spend thousands of dollars to do some things that prove to be wrong because they do not understand the area or the people.
>
> Tom Greene, Mayor, City of Nondalton
> *ISER Overall evaluation interview*

The Unalakleet city manager had his finger on the pulse of much of what is happening in rural Alaskan communities, particularly the widespread problem of generating sufficient funds for rural sanitation operations and maintenance programs:

> *One of our biggest problems here is making the system pay for itself so that we can get everything we need (to keep it operational). It is a bare-bones operation, and*

> *most of the money (we collect) goes for salaries. We are really devoid of a preventive maintenance program, and do not have a large stockpile of parts and supplies. If there is any area that we need help on it is this one.*
> *We have gotten really good service from the state, the feds, the Indian Health Service, and the Alaska Native Health Board over all these years. All these agencies helped us a great deal, but this didn't happen by accident. Our leadership was good, and there was a lot of foresight back in the 1950s and 1960s to plan for and get monies to put this kind of a system in place with the help of these agencies. If other communities would like to learn how we got this system, we would be glad to tell them how we got it together.*

Lessons Learned and Shared

Nearly all the administrators who took part in the ANHB project felt they had learned things that could benefit other communities. For example, the mayor of Nondalton said that his community ". . . learned more about the sanitation system and the new technologies. We also learned about paying for the costs (of those technologies) and conserving water and those types of things. Years ago we didn't conserve water, and we didn't know how to pay for these services. We are learning."

In Shaktoolik the mayor said "The accounting system and the collection system and the ordinances, we learned it all. Computers also played a big part. We are now able to shut people down when they don't pay their bills. We have actually shut people down, and now they have paid their old account up and also paid a $100 reconnect fee, and they said they wouldn't get behind again. These are the things we learned. We were very lenient in the past."

The city administrator of Mekoryuk said he learned that his village needs a full-time utility manager who is not also the city administrator. When he tried to do both jobs over the last few years he discovered that the utility manager's job took about 75 percent of his time. But to keep the city running smoothly, he needed more time for the city administrator's duties. He also felt strongly that "our flush tank haul system seems to be the most viable option for many Alaskan communities because of the lower cost to build, lower maintenance, lower user cost, and the fact that many Alaskan villages have a permafrost problem."

In a similar vein, the mayor of Galena felt that his community's "look at the perkable soil with intermittent permafrost was very worthwhile and could be good for other communities with similar soils."

The Chefornak water and sewer manager felt that his village learned that "it is better to keep the environment clean. We are more aware of the environment."

The Noatak utility manager said her village learned "it takes a lot of work and a lot of people to get a grant." She also believes that she learned several other things through the course of the project, like how to make fliers to educate the community about issues of concern. Through feedback from the community she also learned that her fliers were "really helpful to people . . . making it easier for them to understand (what is expected of them)."

Napaskiak's tribal administrator felt that the community's involvement with the ANHB project helped it to "develop a scope of work and a work plan that will be helpful in other projects, now that we know how to develop it."

The tribal vice president in Tanacross felt that one of the most important things his community learned was to use funding combined with community general fund money and "hire local labor . . . . All the work was done with local labor, and that gets money into the households in the community." The general manager of Too'gha, the Tanana utility, felt that he probably learned "thousands of things" through the course of the project. One of the things he learned is that "it is important to have good communication." Another is that "communities should learn to reach out for other grant funding . . . . I've learned that it is difficult to run a corporate program with no funding source."

Other Issues

In the course of our evaluation of the Phase II projects, we identified some other themes that have long-term public policy implications for water and sewer O&M in rural Alaska. These issues do not as yet have clear answers, but we raise them for discussion and analysis.

Economies of Scale

Even the most capable communities and successful projects in the Phase III group are stretched financially. Three kinds of costs are at issue: paying for management; paying for large, non-routine maintenance projects; and paying for emergency repairs.

Management

The costs of management are largely fixed. For a large utility with many customers, this overhead is spread over a large revenue base. Unalakleet (population 803) is big enough to afford staff that Shaktoolik (population 226) cannot. Communities with populations of about 500 appear to be large enough to afford a utility manager or dedicated clerk, depending on the type of service and condition of the local economy. When the city or tribe operates the utility, there may be some shared staff or management functions that offer some economy or some subsidy in the form of free office space or revenue sharing.

But when the utility is independent, like Toog'ha in Tanana, the management costs are an even larger financial burden. Toog'ha was only a success because outside grants subsidized its excellent management; the washeteria could not support it. The Toog'ha business plan developed by the consultant forecast seven years of deficit operations until the first group of water and sewer customers are connected and begin paying fees. A small community or utility does not have the finances to weather seven years of deficit operations. Tanana also has seasonal cash flow problems, noted by the RUBA.

Capital Funds for Maintenance

According to the RUBAs at the focus group, communities that increased their revenue used these funds for activities related to utilities. Most communities have a long list of utility needs such as meeting payroll and purchasing parts, tools, and supplies. They did not set aside savings for future purchase of parts, emergency funds, or capital expenses. There is no mechanism currently in place to fund large, non-routine maintenance projects like the system improvements undertaken in Nondalton.

First-class and home-rule municipalities with stable revenues issue bonds to finance these sorts of projects. But this mechanism is not available or practical for small communities. They may compete for grant funds through ANTHC or VSW, but these sources are geared more to larger capital construction projects for new systems. Either ANTHC and VSW should

systematically address these maintenance needs, or some state or regional entity should establish a revolving loan fund with subsidized interest rates for small utilities.

Funds to Buffer Risk

One maintenance emergency can throw an improving utility into a tailspin, or take it to the edge. Noatak and Too'gha both had maintenance emergencies that drained their reserves and set them back substantially. Noatak had reserves to draw on, but Too'gha did not.

In Noatak a pump and control panel at the lift station went out. A replacement pump was not available, and it took three months to get the pump sent out, rebuilt, returned and reinstalled. Meanwhile the city had to hire extra labor and the pumper vehicle to move the sewage from the inoperable lift station to the operating lift station. All in all, the community incurred about $17,000 in unplanned expenses. It had to cut the budget and reduce operator hours, thereby performing less O&M. Also, a construction project ruptured the waste heat line, so the community had to pay for heat rather than use waste heat.

Too'gha experienced tight cash flow during the winter of 1997-98 because of increases in fuel and electric costs. This experience gave the utility managers a lesson in the seasonal nature of utility costs. The RUBA staff observed that this seasonality makes the utility especially susceptible to emergencies or large repairs that drain any cash reserves.

In December 1998, the RUBA staff reported:

> *The non-profit was doing well, albeit suffering from a cash flow crunch during these winter months when fuel and electric bills are high. Barring any unforeseen circumstances or emergencies the utility should be able to tighten its belt and make it through the winter.*[10]

At the end of the following quarter (March 1999), the RUBA staff reported

> *Too'gha finances have deteriorated rapidly since the end of last quarter. At the end of December Too'gha was showing a deficit of approximately $1,700. This has increased to nearly $12,000 as of March 31st. The primary reason for the rapid decline appears to be the electrical costs (which have averaged over $2,000 per month for the last four months).*[11]

The high electrical costs were due to the main well going dry and pumping continuously through the line to maintain circulation and prevent freezeup of the line. A pump test on the new water well conducted by the contractor affected water flow to the existing water well; the existing well went dry. To maintain water flow for the utility, water was pumped from the new well into the existing well, and from there into the water distribution system. This dramatically increased electrical and fuel costs for Too'gha.

In early 1999, due to the higher than expected operational costs, the utility manager cut costs by laying off the alternate operator and improving purchasing and scheduling. VSW helped the utility by hiring the remaining operator for construction of the new laundromat.

These are examples of utilities doing well, but operating so close to the financial edge that one breakdown can throw them into failure. The problems then cascade, and it may take

[10] Rural Utility Business Advisor 2rd Quarter FY99 Quarterly Report, Tanana (Too'gha) Activity Report
[11] Rural Utility Business Advisor 3rd Quarter FY99 Quarterly Report, Tanana (Too'gha) Activity Report

years for a utility to recover, assuming no other emergencies happen. When emergencies arise, outside agency help is critical; small communities have little capacity to buffer this sort of risk. Villages also feel they don't have the power to recover damages from utility consultants or engineers who make mistakes. Small communities need some sort of risk-pooling mechanism. A revolving loan fund like the clean water revolving fund might be a useful model.

Elements Work in Concert

Figure 1 on page 10 illustrates the idea that effective O&M is a complex, interdependent system that includes community support, financial resources, management, and the operator's time, skills, plans, and procedures. This idea of interdependence is supported in the RUBA and RMW focus groups. Participants noted improvements in operators' skills in both the project and non-project communities, particularly when the utility manager or clerk and the utility operator had a good relationship. Good rapport, open communications, adequate supervision, and better utility managers were most often associated with utility operators having better training and higher certification levels. This strong work relationship was also linked to the timely ordering and supply of critical parts for the facilities and to the availability of more funding for the utility. Comments from the focus groups provide examples:

> *Noatak was a positive outcome for sure. They've worked really hard, the utility manager has worked awfully hard with the operators and formed good rapport with them, good communications, and goes over ordering critical spare parts with them. So that's a good running operation.*

> *Brevig Mission, there you can put a plus by them . . . . Most of the operators are certified now . . . . They've got excellent city administration. [The whole community backs the operators.] The new city clerk . . . since she got on they're able to purchase new equipment . . . . She gets the operators anything they need . . . more training.*

RUBAs and RMWs at the focus groups indicated a high correlation between the "good" operator attitude and communities with rapport between the administrator or clerk and the operator. The good operator attitude is also tied to communities with high levels of support for utilities. When community support was lacking or the operator did not have the support of the utility manager or clerk, the operator was described as having to nag to get spare parts. In communities with little support for the utilities the operators neither took advantage of nor were given opportunities to take additional training. In a least two cases where there was little community support, utility operators were sent to training yet did not apply the knowledge; they either didn't try to get certification or left the job entirely.

Longer Project Time

Both Shishmaref and Tanana were funded for two years—initially as Phase I projects, then again under Phase II. This longer time made a crucial difference for both these communities. The two-year project also provided us a better opportunity to see the dynamics of improving water and sewer utilities over a longer period.

Shishmaref experienced several ebbs and flows of success and setbacks over the life of the project. The grant period of two and a half years allowed the city and agency staff to try a particular approach, learn from it, try again, learn from the second try, and try a third time. Improving the community capacity for utility management in Shishmaref took longer than one year. The City of Shishmaref needed the second year to provide time to consolidate what it had

learned during the first year. The focused attention of the city, city council, agencies, contractor, and ANHB over a sustained period brought improvements. The foundation has been laid for another round of improvements.

Two years of support permitted Too'gha to firmly established its utility and financial management capabilities and demonstrate its ability to adapt to changing conditions. The O&M project funds provided the critical seed funds to pay personnel costs while the utility consolidated its activities. The manager of this utility had started from scratch, setting up the office, developing a budget, and establishing a manual accounts system. Over the two years of the project, he progressed to computerized systems for accounting, billing, collections, payroll, and tracking vendors.

Learning

The pilot project has been about learning—at every level. The communities are learning to manage their water and sewer facilities and provide O&M; the agencies are learning how to improve their services to communities; and the researchers are learning to observe and provide useful feedback. In an earlier section we summarized what the communities themselves felt they've learned. Here we highlight some other lessons and opportunities for learning.

RUBAs understand that their job is teaching, and they have a good curriculum. For accounting they have developed a graduated process: paper to Excel, then Excel to Quicken or Quickbooks. Managers or clerks can start at any level, and RUBAs will help them take one step up. Whatever the system, the emphasis is on up-to-date and timely information for management and planning.

A paper system gets the utility managers started, and then they move on to computerized systems. They learn to set up the books in the new system, then spend a period maintaining dual systems before abandoning the old. The O&M grants help villages focus on this task and improve their accounting. New Stuyahok is one of the few communities where it didn't work. Tanana is an unusual example in that the utility manager progressed rapidly from hand ledgers to the most sophisticated computer accounting system, Quickbooks Quick Pro 5. The utility management training is also very well received and likely to show results over a multi-year period.

When RUBAs go into communities, they provide perspective for planning and improvement by assessing seven aspects of the utilities (finances, accounting systems, tax problems, personnel systems, organizational management, leadership, and operation of the utility). The RMWs concentrate on direct technical assistance, keeping the systems running and responding to emergencies. Between the two is a missing link: the development of operations plans, policies, procedures, and paperwork. The RMWs complain about communities without preventive maintenance plans. But many communities lack knowledge about how to create such plans. There should be a graduated curriculum for preventative maintenance planning—from maintenance logs written on the wall to computerized record keeping. RMWs need to translate from the engineers' documents to something that works for the operators.

The RUBA's quarterly reports with the management score card are valuable tools, but they could be used in new ways to help community managers and administrators learn. They could be shared with the communities, to help them monitor their own progress and set

improvement goals. RUBAs could also solicit community self-evaluations by local managers or administrators to include with the quarterly reports. Self-evaluation requires staff people to engage and reflect; it builds planning into their routine. It could help create a relationship between RUBA and local administrators. It might also develop a record—of what grants exist and other vital information— for any new administrators when there is job turnover.

Adding an RMW section to the RUBA report, quarterly or annually, would also make the report more comprehensive and build in more communication between the RUBAs and RMWs, which currently varies according to the individuals involved.

Another learning opportunity is debriefing after an event. If the RMW, operator, utility manager and RUBA had, for example, discussed the pump failure in Noatak and how they had responded, with 20-20 hindsight they might collectively learn to prevent or mitigate expensive future events. This is in line with "total quality management," now being emphasized at federal and other organizations.

The RMWs would like to be consulted more—by engineers, RUBAs, and grant agencies like ANHB. The focus group had some suggestions for facility planning and design:

- Include RMW input; have RMWs review and mark up design plans.
- Plan systems that are as simple as possible, with consistency between the water plants and sewer systems.
- Include financial analysis in the planning; analyze the operating costs of alternative systems and the economic structure of the communities.

Conclusion

Our evaluation of the ANHB's operation and maintenance demonstration grant program is synthesized from three primary sources: the data record collected for each community; interviews with community administrators; and independent observations and assessments from RUBAs and RMWs. While our research methodology is primarily qualitative, we attempted to codify and analyze three sets of quantitative measures. These are coding and tabulation of changes in outcome indicators as documented in the record; statistical analysis of the RUBA and RMW questionnaires comparing project with non-project communities; and analysis of public data, specifically EPA records of major drinking water violations. While the quantitative analysis based on project data (as shown in Figures 2 and 3) suggests widespread improvements resulting from the project —in both operation and maintenance and in management—these findings are not robust. Our samples were too small and the variation in the data too great to allow us to draw statistically significant conclusions.[12] Also, our independent measures do not all concur.

Our qualitative analysis found broad consensus that the ANHB pilot program is a valuable complement to existing programs. RUBAs, RMWs, and community administrators all said they would like to see this type of small O&M project grant institutionalized. Based on our reading of the record, we agree that the ANHB approach makes a unique contribution to

[12] Case study methods do not lend themselves to quantitative analysis. Robust analysis typically requires larger samples, more precisely defined measures, and quasi-experimental research design to control for the many variations among communities.

the joint effort to build water and sewer management and O&M capacity in rural Alaska. Attributes of the ANHB approach that were widely endorsed include:

- Inclusivity, making the grants accessible to communities with all levels of administrative capacity
- Emphasis on partnership, both internal and external
- Emphasis on community initiative and design, building strategic planning skills
- Flexibility in the kinds of activities funded as well as the timeline, tailored to the needs and priorities of each community
- Very personal staff support, including multi-day site visits, generous telephone consultation, and willingness to talk through or help with any issue

Administrators were grateful that the ANHB staff worked to tailor programs to the particular needs of their communities. Indeed, one of the most frequent praises of the ANHB staff by community leaders was that each of them had, at one time or another, come directly to the villages to visit and try to understand the conditions and circumstances that existed there. Another characteristic of the ANHB staff that pleased administrators was that they encouraged the village to largely determine their own course. They listened, visited the villages, offered suggestions about options and possibilities, and were available for ongoing consultation and support. Leaders were then free to consider all options and discuss them with the community at large. Staff support that was personal, caring, and educational rather than directive created programs that community leaders found satisfying and productive.

> The benefit of ANHB grants [was] . . . that it would help focus the councils and the mayors and the leadership in general vision or purpose on utility issues. Because it [the money] was there . . . they were a hell of a lot quicker to grab hold and spend time to get focused on that issue than they would have been by us going in solely and saying you need to deal with utility management.
>
> Mike Black
> RUBA Focus Group

The current concept and practice of small, competitive, flexible O&M grants was broadly endorsed. While community administrators had not even one critique of the ANHB program, RUBAs, RMWs and the evaluation team all had some suggestions for the program, if it were to be ongoing.

- Increase input from RMWs and Native regional corporations in the application and selection processes.
- When evaluating the applications, assess the level of community involvement and support.
- Require partnership in the work plan and implementation such that communities have to play an active role and meet certain criteria.
- Encourage involvement of the schools.
- Encourage utility management training.
- Encourage preventive maintenance planning.

> I think every community should do a program such as this because it makes them start thinking about what they really need, and what they need to do in the future, what they need to do in the immediate, in the present.
>
> Tom Greene, Mayor, City of Nondalton, ANHB Closeout interview

- Encourage projects that plan ahead for a new system and involve the RUBA or LGS, RMW, and engineers in project planning.
- Consider renewal requests for second year funding to support the long-term process of capacity building in selected communities.
- Consider delaying a project, or portions of a project, to improve coordination with construction or other events, in keeping with the larger goals for the project.
- Consider regional projects to build communication, teaching, and sharing of information or services across communities and to provide opportunities to discuss what communities have learned from their projects.
- Review and comment on those hired to work on the grant to ensure the best-qualified people are hired; reduce the influence of family relationships.
- Increase accountability of communities for funds expended, training received, completing tasks, and addressing the project's goals. More accountability for tasks may require more specific work plans and more formal tracking when the work plans are amended.
- Limit the project grants to eight to ten communities per year, to allow for more staff attention and to lower the expectation that the grant might be a recurring source of funds.

ANHB was very effective in administering these grants. From its easy-to-use quarterly report formats, to its systems for project tracking and accounting, to its village-savvy staff, ANHB elicited trust and respect from both communities and agencies. If this type of program were ongoing, however, it would not necessarily fall to ANHB to administer it. In evaluating which agency would do that, we note that Alaska Native agencies generally have a big head start in establishing rapport with villages. It was also useful that ANHB was effectively a neutral third party on water and sanitation and other community issues.

We also made findings on the types of activities that contribute to long-term improvements in O&M. We preface the discussion by emphasizing that consistent, committed leadership and broad support were the key ingredients for success in every case. Where this was present, these are some strategies that worked to improve utility management or O&M:

- City-tribe cooperation fosters internal partnership, community support, and effective leadership that are essential to improving water and sewer management and O&M.
- Agency partnership is instrumental for community leaders who are ready to make changes and welcome outside coaching. Improved communication and coordination between agencies serving a community also helps community leaders focus and coordinate their efforts.
- Hiring a utility manager or clerk is a strategy for developing focus and expertise in utility administration and increasing the time and planning devoted to it. This proved to be highly effective, but perhaps too expensive for small utilities.
- There may be significant opportunities to improve the cost efficiency of old systems through system maintenance and repairs.
- Enforcing homeowners' responsibilities can lead customers to take better care of their plumbing and service lines as well as shift some of the expense from the utility.

- Community education can inform customers of their responsibilities and coach them on how to properly use and care for the facilities, thereby lowering maintenance costs.
- Public education about need to pay for utilities and discussion of what the money is used for
- Computerized monthly billing and accounting
- Raffles rewarding customers with zero balances
- Credible enforcement of payment policies
- Rate studies and fee increases
- Improved maintenance and service
- Allocation of gaming revenues to help pay for utilities
- Capable, committed or aggressive utility managers or clerks
- RUBA coaching and training on financial management

The original purpose of the operation and maintenance (O&M) demonstration grants was to improve O&M. The Phase II projects focused primarily on educating and involving the customers and on improving utility management—on the premise that these activities are fundamental to improving O&M. While several of these cases lend support to that idea, it has been somewhat disappointing, especially to the RMWs, not to see more direct improvements in O&M. We note that building community capacity is a long-term strategy and that we should not expect measurable results in such a short time.

Still, it is useful to remind ourselves that improved O&M is after all the goal, and to open the agenda to new ideas and strategies to achieve that goal. In the RMW focus group, the participants emphasized having a current preventive maintenance plan for each utility. To follow up on this, agencies might direct their attention to preventive maintenance planning and training. This would allow for thoughtful development of a graduated curriculum for preventive maintenance planning that RMWs or others could use to make tracking, implementation and accountability for preventive maintenance understandable and practical for operators at any level of professional development.

Finally, these case studies highlight an issue that warrants further study and policy deliberation: the question of whether small, remote communities have the fiscal capacity to support full-service, Arctic-design water and sewer systems. We found that even the most capable communities and successful projects in the group are stretched financially. This issue has three dimensions: meeting the fixed cost of management overhead for small systems; paying for large, non-routine maintenance and facility upgrade projects; and weathering bad years—whether due to a poor economy and low revenues or to extraordinary expenses.